26th Annual Central States Forest Soils Workshop

in the Big Spring Area near Poplar Bluff, Missouri



October 10-12, 2006

26th Annual Central States Forest Soils Workshop



Sponsored by:

Natural Resources Conservation Service
Missouri Association of Professional Soil Scientists
Missouri Department of Natural Resources
Missouri Department of Conservation
United States Forest Service
National Park Service

2006 Workshop Committee:

Clayton Lee, NRCS
Dan Childress, NRCS
Dennis Meinert, DNR
Dennis Potter, NRCS
John Depuy, USFS
Leon Thompson, DNR
Tracey Wiggins, NRCS











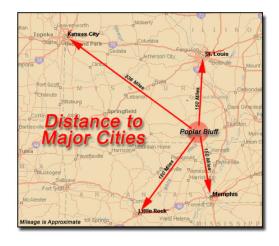


Agenda

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Tuesday, October 10	Soil Pit #2 with forestry discussion Leon Thompson, MDNR
4:00-6:00 pm Registration	John Depuy, USFS
6:00–8:45 pm Presentations	3:30 – Buses depart from Pine Knot (Hwy DD)
Welcome (John Depuy, MC) Dennis Potter, State Soil Scientist, NRCS Lisa Allen, State Forester, MDC Paul Strong, Deputy Forest Supervisor, USFS	4:00 – Big Spring (Ozark National Scenic Riverway) Soil Pit – Dr. Michael Aide, SE MO State University Bottomland Reforestation – Tim Breen, NPS 5:00 – View Big Spring
Noel Poe, Park Superintendent, NPS	
Introduction to Big Springs Area Geology – Gretchen Moore, USFS Soils – Dan Childress, NRCS	5:30 – Dinner @ Big Spring Pavilion 6:30 – Business meeting Led by Dennis Potter
Forestry – Lisa Allen, MDC Natural Communities – Paul Nelson, USFS ECS – Tim Nigh, MDC	7:00 – Buses depart Big Spring to Holiday Inn
Soil Productivity Studies on Forested Areas - Felix Ponder	Thursday, October 12, 2006
Wrap Up	7:00 – Buses Begin Loading – Holiday Inn
Wednesday, October 11	7:30 – Buses depart from Holiday Inn
7:00 am – Buses Begin Loading – Holiday Inn 7:30 – Buses depart from Holiday Inn	8:00 – Ellsinore Soil Pit – Mike Cook, NRCS Discussion: Tornado Damage Reforestation and impact o ATVs and horses – Bob Harrell, USFS
9:30 am – MO Ozark Forest Ecosystem Project	9:30 – Buses depart from Ellsinore
Soil Pit #1 with forestry discussion: John Preston, NRCS John Kabrick, USFS Soil Pit #2 with forestry discussion: Dennis Meinert, MDNR Tim Nigh, MDC Soil Pit #3 with forestry discussion: Dick Henderson, MDNR	10:00 – Oak Ridge Conservation Area Soil Pit #1 with forestry discussion Dan Childress, NRCS Ross Glenn, MDC Soil Pit #2 with forestry discussion: Rod Taylor, NRCS Mike Anderson, MDC
John Tuttle, MDC	12:00 - Adjourn
11:30 – Buses depart to Alley Spring	
12:00 – Lunch & visit the spring	
1:00 – Buses depart from Alley Spring	A big THANK YOU to the following:
2:00 – Pine Knot Ecosystem Restoration Area (Hwy DD) Soil Pit #1 with forestry discussion: Tim Knoerschild, MDNR	Three Rivers Sheltered Workshop of Shannon County for lunch at Alley Spring.
Dave Moore, USFS	Van Buren Lion's Club for the fish fry at Big Spring.
•	MAPSS for the refreshments.

Welcome...

to the 26th Annual Central States Forest Soils Workshop held in the Big Springs area near Poplar Bluff, Missouri.



Poplar Bluff is about 150 miles from St. Louis, MO, Little Rock, AR, and Memphis, TN.

The biggest employers in the area are Three Rivers Healthcare, Briggs & Stratton Corporation, Rowe Furniture Company, Gates Rubber Company and Walmart.





Residents and visitors enjoy a variety of outdoor attractions like Big Spring State Park, the Current River and the Black River, Lake Wappapello and the Mark Twain National Forest, which is part of the Ozark National Scenic Riverways. Most of these places offer camping, fishing, hiking, boating and/or canoeing.

History of the Central States Forest Soils Workshop

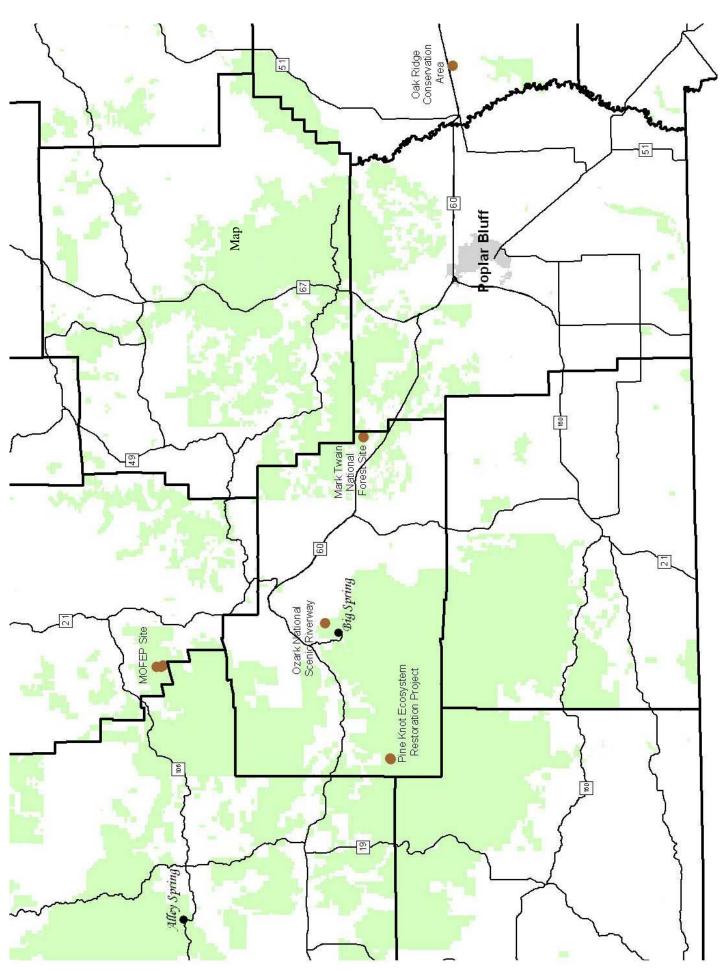
The Central States Forest Soils Workshop (CSFSW) came into existence during the Lake States Forest Council Meeting at Bloomington, Indiana in the fall of 1979. Individuals from Indiana, Illinois, Kentucky, Missouri and Ohio met and decided to form their own forest soils group in order to focus on the soils and forests of the region. The name, Central States Forest Soils Workshop, was chosen for the group as a means of identifying the region involved and to signify that this was a working group that would actually be deeply involved in field trips and personal, on-site discussions and experiences.

The CSFSW is a loosely structured organization without officers or a chapter. It has operated quite well on an informal, volunteer basis. Each year someone, or a group of individuals, volunteers to host the next year's workshop. A treasury accompanies the host's responsibility. The workshop's format has remained relatively constant though out the years and are generally planned for the 2nd or 3rd week of October. An evening overview session allows individuals from the participating states to travel during the day. The evening session has guest speakers that set the background for the field stops by presenting information about the geology, soils and vegetation of the area. Field stops usually cover a wide variety of soil-site-forest (ecological) conditions. Soil pits are opened to expose the soil profile. At each field stop a soil scientist will present information about the soils and a forester will present information on the forest growth and management implications. Other specialists are on-site as needed.

A cookout/dinner/banquet usually follows the 1st day's field stop. Some form of entertainment and a very short business meeting to identify the next year's workshop host, follows the meal.

The following table lists the host state and location:

1st	1980	Berea, Kentucky	14 th	1993	Jefferson City, Missouri
2 nd	1981	Salem, Missouri	15 th	1994	Marion, Illinois
3rd	1982	Wooster, Ohio	16 th	1995	Nelsonville, Ohio
4 th	1983	Carbondale, Illinois	17 th	1996	Bloomington, Indiana
5 th	1984	Jasper, Indiana	18 th	1998	Red River Gorge, Kentucky
6 th	1985	Cadiz, Kentucky	19 th	1999	Standing Stone State Park, Tennessee
7 th	1986	Cleveland, Tennessee	20 th	2000	Hannibal, Missouri
8th	1987	Sikeston, Missouri	21st	2001	Matteson, Illinois
9 th	1988	Pere Marquette State Park, Illinois	22 nd	2002	Toledo, Ohio
10 th	1989	Chillicothe, Ohio	23rd	2003	Scottsburg, Indiana
11 th	1990	Seymour, Indiana	24 th	2004	Hazard, Kentucky
12 th	1991	Jackson, Tennessee	25 th	2005	Great Smoky Mtn. State Park, TN
13 th	1992	Park City, Kentucky	26 th	2006	Poplar Bluff, Missouri



CSFSW Site Location Map

Welcome & Introduction to the Big Springs Area

Dennis K. Potter, State Soil Scientist, NRCS:

Dennis K. Potter is currently serving as the State Soil Scientist with the Natural Resources Conservation Service in Columbia, Missouri. In this role, he leads the Federal portion of the National Cooperative Soil Survey Program in Missouri and provides leadership to the Resource Inventory and Assessment Staff. This staff includes the State RIA Staff and 6 MLRA Soil Survey Offices in Missouri.

Dennis has worked for the Natural Resources Conservation Service since 1976 beginning his career as a Soil Scientist in Mississippi County in southeast Missouri. From there he transferred to Columbia, Missouri to supervise the map finishing shop. After 1 year in that position, Dennis transferred to Farmington, Missouri to work on the soil survey of St. Francois and Ste. Genevieve Counties, Missouri. In 1981 he was selected as the Soil Survey Project Leader in Macon, Missouri and supervised work on Randolph and Macon Counties Soil Surveys. From Macon, Dennis transferred to Washington, Missouri as an Area Resource Soil Scientist. In 1989 Dennis accepted the Soil Correlator position in the Missouri State Office where his major responsibilities included the correlation of soils in Southern Missouri. He became the State Soil Scientist in January 2000.

Mr. Potter has a B.S. degree in Soil Conservation from Central Missouri State University. He currently resides on a farm near Fayette, Missouri with his wife Bonnie. Dennis and Bonnie are the parents of Benjamin who resides in Chicago, Il. with his wife Sarah and daughter Kate and Susan Craig who lives in Columbia with her husband Justin.

Lisa Allen, State Forester, MDC:

Lisa Allen is currently serving as the State Forester with the Missouri Department of Conservation. In this role, she provides state-wide leader-ship for current and future forestry issues and oversees the activities of the Forestry Division and its 235 employees.

Lisa has worked for the Missouri Department of Conservation since 1984 beginning her career as an Assistant Resource Forester in southeast Missouri. From there she was promoted and transferred to Columbia, Missouri to continue her field forestry experience as a Resource Forester. After 10 years of professional field forestry assistance to private landowners and responsibility for the management of state-owned Conservation Areas, Lisa began her administrative career in Jefferson City as the supervisor for the Department's Urban and Community Forestry Program and then as a Forest Management Chief supervising forestry operations in southern and eastern Missouri. After 19 years in the Department's Forestry Division, Lisa was selected as the Private Land Services Division Administrator. In this role, she lead a staff of approximately 90 professional forest, fish and wildlife managers who primarily assist private landowners with the conservation of the natural resources on their private property.

Ms. Allen has a B.S. degree in Forest Management and a M.S. degree in Urban and Community Forestry, both from the University of Missouri in Columbia. She currently resides in Jefferson City with her husband and three children.

Douglas F. Oliver Poplar Bluff District Ranger, USFS:

Noel Poe, Park Superintendent, NPS:

Noel Poe grew up on the Great Plains on an eastern Colorado cattle ranch and irrigated corn farm. Noel received a Bachelor of Science Degree in Forestry and Natural Resources from Colorado State University in 1968.

Noel has worked in 10 National Park Areas in the 35 years he has with the National Park Service. He started out as a seasonal interpretive park ranger, was hired as a law enforcement field ranger for his first permanent position but quickly moved over to park management. He has been in management for 19 years and Ozark Riverways is the 4th park that he has served in as the park superintendent. Noel and his wife Mary moved to Van Buren in October 2002 to become the park superintendent.

As superintendent, he is responsible for the overall supervision and leadership direction for the Riverways, which includes the management of natural resources, cultural resources and public use. The park has a permanent staff of approximately 75 and a seasonal staff of 50+ employees and a budget of approximately \$5.3 million.

Noel and Mary purchased a home near Van Buren and live with their 2 horses and Great Dane dog. Their three sons are married. One is working for Park Service in Utah, another for U.S. Forest Service in Alaska and the youngest as an environmental lawyer in Montana.

All About the Big Springs Area

Geology

Gretchen Moore, Staff Geologist - Mark Twain National Forest, USFS

Soils (see pg. 10-11)

Dan Childress, Soil Scientist - Natural Resources Conservation Service

- 1. Mississippi River Valley Alluvium and Crowleys Ridge
- 2. Deeply weathered Ozark uplands
- 3. Ozark uplands that vary in depth to limestone or dolomite
- 4. Stream valleys in the Ozarks

Forestry

Lisa Allen, State Forester - Missouri Department of Conservation

Forests and woodlands once covered nearly 70% of all land in Missouri. However, forestland now covers roughly 32% of the state for a total of 14.5 million acres. Missouri's forestland is predominately oak-hickory forests with nearly 3/4 of all forested land being described as "oak types". Other types found on a state-wide basis, but each making up less than 7% of the forest land, are maple types (maple, elm, basswood, ash), eastern red cedar-hardwood types and shortleaf pine-oak types. In the eastern Ozark region (the heaviest concentration of forestland in Missouri), 90% of the forests are oak dominated. Growth potential for most Ozark forestland is marginal with site index for oak species generally between 45 and 75. Continuous forest inventory data tell us that Missouri forests produce on average 75 board feet per acre per year.

The forests of Missouri are predominately privately owned (85%) by families and other non-industrial landowners. This forestland is often an important source of supplemental income for the landowner. This results in a strong wood products industry in Missouri that supports more than 32,000 jobs each year and contributes roughly \$4.43 billion annually to Missouri's economy. Although total acres of forestland is on the increase in Missouri (over 1 million acres of forestland has been added in the past 30 years), forests in this state are at risk. Urbanization and development pressures are contributing to forest fragmentation and reduction of large forestland holdings important to many species of wild-life. In addition, forest health issues such as oak decline, red oak borers, emerald ash borer and invasive exotic species threaten healthy and sustainable forests in Missouri. And finally, unmanaged or improperly managed forests threaten the future of the wood product industry and sustainable forests in Missouri. It is critical that these threats are aggressively addressed in the future to ensure healthy and sustainable forests which support numerous environmental (clean air, abundant water, diverse wildlife habitats), social (outdoor recreation, rural community, rural landscapes) and economic (wood products, tourism, hunting and fishing) benefits.

The Missouri Conservation Commission has constitutional responsibility and authority to restore and manage the forest resource of Missouri. The Forestry Division of the Missouri Department of Conservation is organized to implement the forest conservation mission of the organization. The Forestry Division is made up of roughly 235 employees participating in multiple program areas. These include a fire management program, an urban and community forestry program, a state forest nursery, a private land technical assistance and cost-share program for forest management, the management of public conservation areas, and a forest products industry support program. Broad accomplishments in these program areas includes: wildfire suppression and prescribed fire as a management tool; training and support to roughly 800 rural fire departments; \$380,000 annually in grants to rural fire departments; \$270,000 annually in grants to roughly 40 communities to improve their community forests; support to roughly 70 communities to acquire and maintain Tree City USA status; 5 million seedlings a year produced at the state forest nursery; every fourth grade student (120,000) in the state receives a tree seedling on Arbor Day; forestry technical assistance to approximately 2,000 private landowners annually; management of about 450,000 acres of public forestland including active management (forest inventory, timber sales, timber stand improvement, prescribed fire, etc.) on approximately 58,000 acres; and annual support to the forest products industry by providing professional timber harvester training and contact with about 300 sawmills annually.

Natural Vegetative Communities

Paul Nelson, Planning Biologist – Mark Twain National Forest, USFS

Basic Premises to Restoring Healthy Natural Communities-and Healthy Soils by Paul Nelson

Soil quality can be defined as "the capacity of a soil to function within ecosystem boundaries...(Doran and Parkin 1994)." What are (or were) these ecosystems? How have changes in the forces that shaped them affected modern-day soils? What are we doing to restore and sustain now rare soil types? This topic will briefly explore premises based on the concept of "Historic Range of Variability (or HRV)" for healthy ecosystems, desired conditions for natural communities and their management implications. This will lay the foundation for field trip discussions on the Mark Twain National Forest.

All About the Big Springs Area

Ecological Classification System (see pg. 12-14)

Tim Nigh, Research Scientist - Missouri Department of Conservation

Missouri has applied the USFS approach to develop an Ecological Classification System (ECS). The system is spatially heirarchical and has been used to map and describe ecological units at ecoregional, subregional, landscape and site scales. The system has proven to be very useful in identifying and pursuing natural resource management priorities at multiple spatial scales. This presentation will be a brief overview of the system and its use.

Long Term Soil Productivity

Speaker: Felix Ponder, Research Soil Scientist

BIOMASS REMOVAL AND SOIL COMPACTION INFLUENCE ON PRODUCTIVITY OF AN ARTIFICIALLY REGENERATED FOREST STAND IN THE MISSOURI OZARKS

Felix Ponder, Jr.

Summary-- Intensive harvesting, which removes a greater proportion of the forest biomass than conventional harvesting and the associated nutrients, may cause a decline in forest productivity. Similarly, more frequent use of heavy equipment in intensive forest practices can lead to soil compaction and consequently reduce productivity. Planted red oak, white oak, and shortleaf pine response to three biomass removal levels (1. removal of boles, 2. all surface organic matter removed, forest floor not removed, and 3. removal of all surface vegetation plus forest floor) combined in a factorial design with three levels of soil compaction (1. none, 3. moderate, and 3. severe) is being studied in one of the Forest Service Long-Term Soil Productivity (LTSP) research studies located in the Missouri Ozarks. The silt loam soils on the study site are primarily of the Clarksville series (Loamy-skeletal, mixed mesic Typic Paledults). Before harvesting, the study area contained a mature upland oak-hickory (*Quercus-Carya* spp.) forest with some oak-pine (*Quercus spp.-Pinus echinata* Mill.) communities. Growth and survival data will be presented and discussed.

Soils

- 1. Mississippi River Valley Alluvium and Crowleys Ridge
- 2. Deeply weathered Ozark uplands
- 3. Ozark uplands that vary in depth to limestone or dolomite
- 4. Stream valleys in the Ozarks

Western Lowlands formed in old alluvium or loess-covered terraces. In places, sandy alluvium has been reshaped into dunes. Soils are mostly Alfisols.

Soil and landform	Family particle-size	Representative Soil Series
Dunes or sand hills	loamy fine-loamy	Broseley Bosket
Loamy	fine-loamy	Tuckerman
Silty	fine-silty	Calhoun
Silty to clayey with high levels of sodium	fine fine-silty	Crowley Bonn, Foley, and Lafe
Clayey	fine fine fine	Forestdale Kobel Jackport

Most soils in southeastern Missouri formed in very old and deeply weathered, cherty, clayey material. Depth to unweathered limestone or dolomite generally is tens of feet. Soils formed in this old material are Ultisols. Loess caps the broad ridge tops and ranges from 20 inches in the central Ozarks to 32 inches near the Ozark escarpment. Fragipans are common in the underlying very gravelly material. Loess may influence the upper solum of gravelly soils found on the more sloping parts of the landscape. Soils follow slope and landforms.

Hillslope	Soil and landform	Slope (pct)	Family particle-size	Family particle-size
Summit	loess-capped interfluves	3 to 8	fine-silty fine-loamy fine	Captina Tonti Viburnum
Shoulder and narrow summits	gravelly soils on narrow crests and transitional areas to hillsides	8 to 15	loamy-skeletal over clayey loamy-skeletal loamy-skeletal	Poynor Scholten Clarksville
Backslope	gravelly soils on hillsides	15 to 45	loamy-skeletal loamy-skeletal loamy-skeletal	Clarksville Coulstone Scholten
Footslope	gravelly to loamy colluvial soils	3 to 15	fine-loamy fine-loamy	Cornwall Taterhill

Where stream valleys deeply incise the landscape, mass wasting has greatly reduced the depth to limestone or dolomite. These areas are characterized by uneven, complex slopes; ledges and outcrops of bedrock; and old landslides or slumps. Soils are Alfisols or Mollisols, although locally they are mixed with the previously discussed Ultisols. Clay content in the subsoil may exceed 90 percent. Slope and landform are not important predictors of soil. Depth to bedrock is variable.

Depth to bedrock (inches)	Family particle-size	Representative Soil Series
4 to 20	loamy-skeletal clayey-skeletal clayey	Moko Gasconade Opequon
20 to 40	very-fine very-fine very-fine	Arkana Bardley Gatewood
40 to 60	very-fine	Niangua
60 to 80 or more	loamy-skeletal over clayey very-fine loamy-skeletal	Alred Gepp Rueter

In small stream valleys, soil that formed in recent alluvium generally are excessively- or well-drained. Soils are Entisols and Inceptisols. Many streams lose water to underground caverns. Soils formed in old alluvium range from clayey to gravelly.

Parent material	Soil and landform	Slope (pct)	Representative Soil Series
Recent alluvium	coarse-textured alluvial soils	0 to 3	Relfe Gladden Sandbur
Old alluvium	fine- to coarse-textured soils on stream terraces	1 to 8	Bearthicket Deible Tilk Waben Zanoni

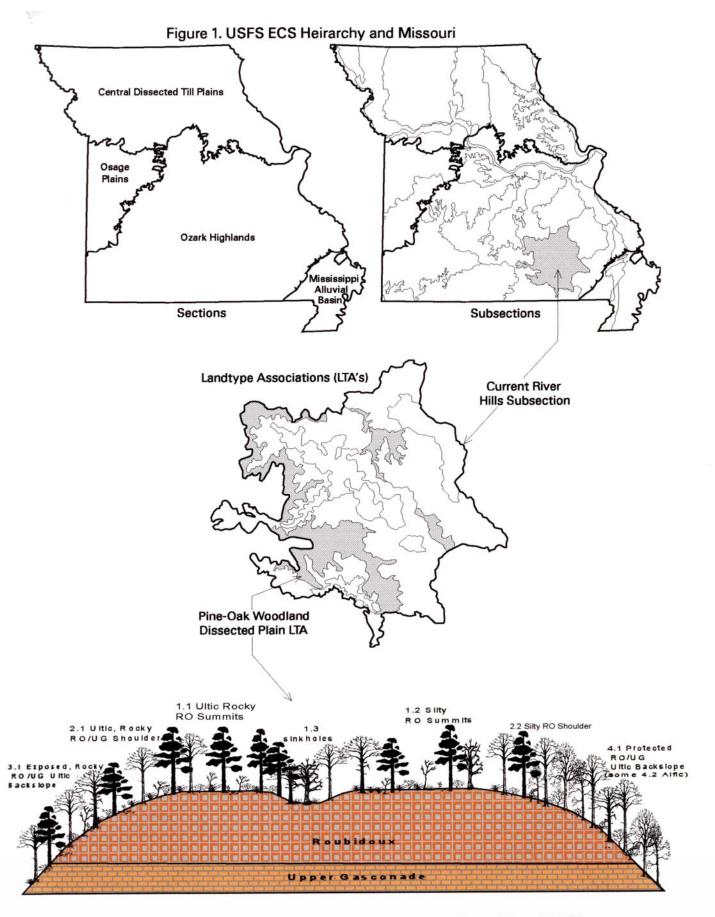
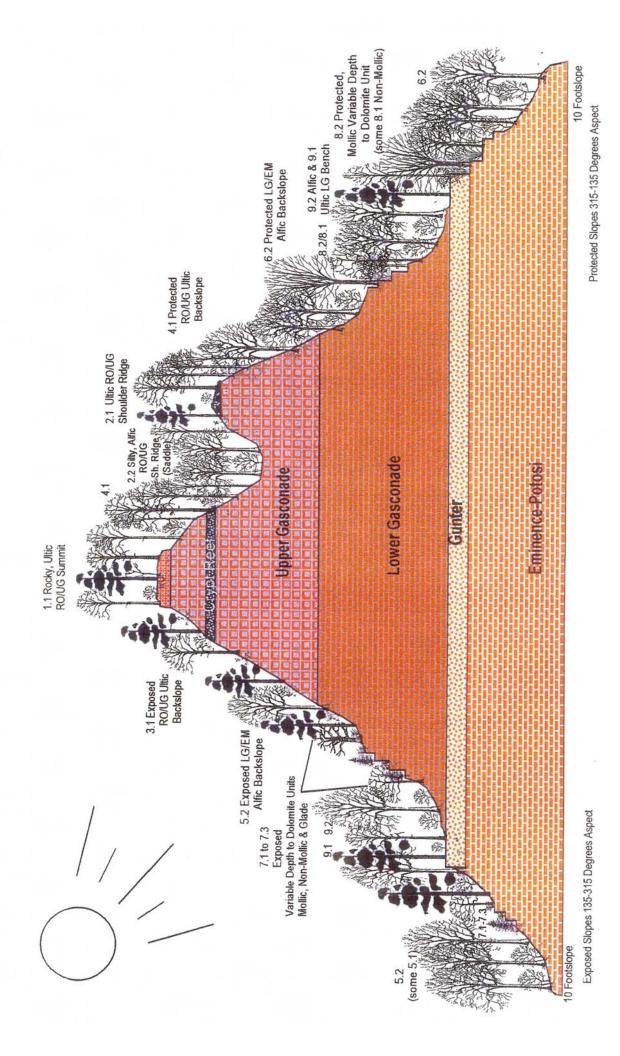


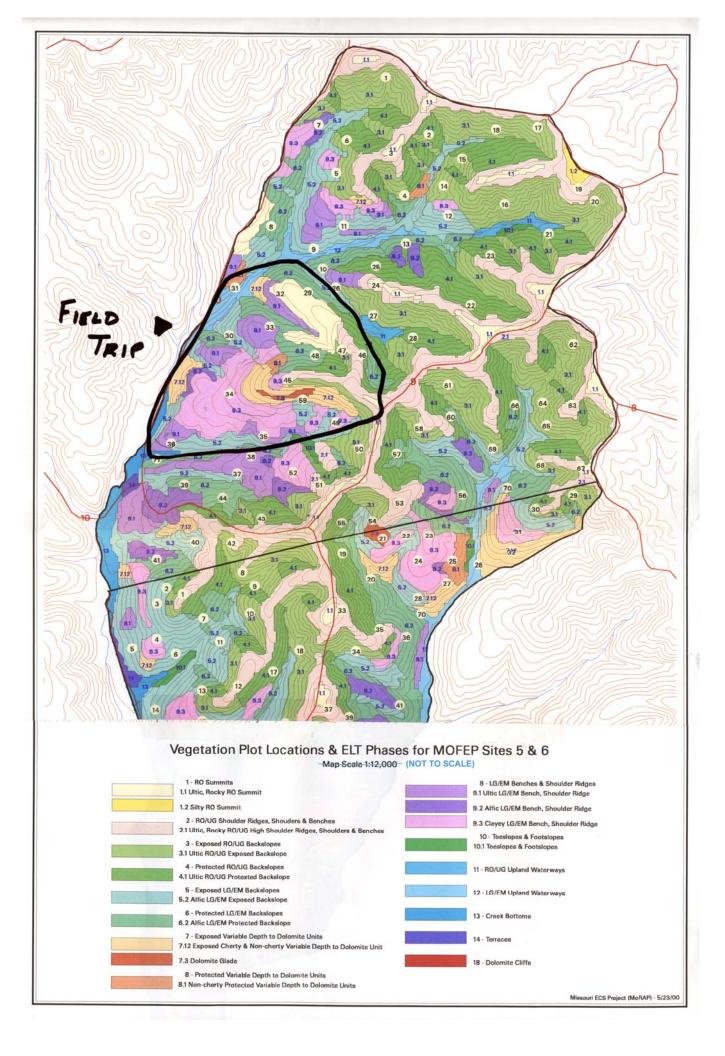
FIGURE 2.3 UPLAND ELTPs IN THE CURRENT AND ELEVEN POINT OAK FOREST BREAKS LTA



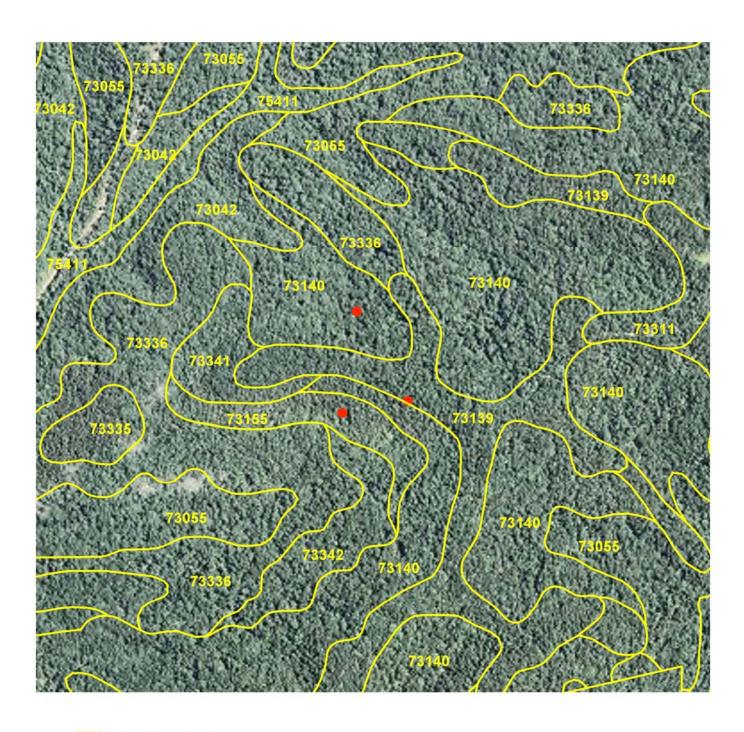
UPLAND ELTPS IN THE CURRENT AND BLACK RIVER OAK FOREST BREAKS LTAS NAMES AND BRIEF DEFINITIONS

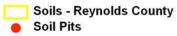
	D OCCU	F C		GEO- LANDFORM	A D B	SOILS	VEGETATION TYPE	COMMENT
	ר	m	8		C T			
1 RO/UGSummits								
1.1 Rocky RO/UG Summit	D	×	R	RO/UG Summits	Any	Mod. deep, gravelly, ultic Poyner, Bendavis, Clarksville	Pine-Oak/Vaccinium Dry Ultrc(chert) Woodland	Current pine and forb diversity > 1.2
1.2 Silty RO/UG Summit	DC	М	R	RO/UG Summits	Any	Deep, silty, ultic, fragic Hog Creek, Tonti	Pine-Oak/Vaccinium Dry Ultic(chert) Woodland	Currently more open, less diverse than 1.1
2 RO/UG Shoulders, Shoulder Ridges and Benches	tenches							
2.1 Ultic, Rocky RO/UG Shoulders & ShRidges	ОО	U	S R	RO/UG Shoulders & ShR	Any	Mod. deep, very gravelly, ultic Bendavis, Poyner, Clarksville	Pine-Oak/Vaccinium Dry Ultic(chert) Woodland	Like 3.1; pine and ultic woodl spp.> summits
2.2 Alfic RO/UG Shoulders, Sh. Ridges & Benches	D	×	O R	RO/UG Shoulders, Sh. Ridge& High Benches	Any	Deep, very gravelly, alfic Rueter, Alred	Mixed Oak-Pine/Desmodium, Vaccinium Dry-mesic Alfic (Chert) Forest	More productive version of 2.1, with added upland generalists
3 Exposed RO/UG Backslopes								
3.1 Exposed Ultic RO/UG Backslope	C	U	D R	RO/UG Backslopes	136-315	Deep, extremely gravelly, ultic Clarksville, Coulstone, Poyner	Pine-Oak/Vaccinium Dry Uluc(chert) Woodland	Similar to 2.1, often more open & diverse
4 Protected RO/UG Backslopes								
4.1 Protected Ultic RO/UG Backslope	C	U	D R	RO/UG Backslopes	316-135	Deep, very gravelly, ultic Clarsville, Coulstone, Poyner	Mixed Oak-Hickory/Dogwood/Desmodium Dry-mesic Ultic (Chert) Forest	low-mod ground flora diversity, common upland forest generalists
5 Exposed LG/EM Backslopes								
5.1 Exposed Ultic LG/EM Backslope		υ	oc.	LG/EM Backslopes(Gunter)	136-315	Mod. deep, very gravelly, ultic Coulstone, Clarksville, Poyner	Pine-Oak/Vaccinium Dry Ultic(chert) Woodland	Sandstone/cherty areas near Gunter
5.2 Exposed Alfic LG/EM Backslope	N N	Ω	υ υ	LG/EM Backslopes	316-135	Deep, very gravelly, alfic Alred, Rueter	Mixed Oak-Pine/Desmodium, Vaccinium Dry-mesic Alfic (Chert) forest	Most productive Pine oak sites, mix ultic woodland and alfic species
6 Protected LG/EM Backslopes								
6.2 Protected Alfic LG/EM Backslope (No Ultic 6.1 identified)	W.	D	0	LG/EM Backslopes	316-135	Deep, very gravelly, alfic Alred, Rueter	Mixed Oak (White,Red)/Dogwood Dry-mesic Alfic (Chert) Forest	Very rich and productive, common alfic sp. 6.1 Ultic Phase does not occur in region.
7 Dolomite Glade/Woodland Complexes								
7.1 Mollic(Cherty), Exposed Variable Depth to Dolomite Unit	R O	D	CR	UG,LG,EM Backslopes, Shoulder Ridges or Benches	136-315	Variable depth, very gravelly, alfic Bardley, Rueter	Post Oak (BJ Oak, Pine)/Bluestem Xreic Chert Woodland	Often narrow bands above glades, mix ultic woodland and glade species
7.2 Non-Mollic (Non Cherty), Exposed Variable Depth to Dolomite Unit	M	O	C R	LG,EM Backslopes, Shoulder Ridges or Benches	136-315	Variable depth, gravelly, mollic Moko, Gasconade, Arkana	Red Cedar-Hardwood/Redbud Dry Dolomite Woodland	Can range onto protected aspects ;nomally narrow band below glades, chert free strata.
7.3 Dolomite Glade	R	υ	CR	UG,LG,EM Backslopes, Shoulder Ridges or Benches	136-315	Shallow, clayey, mollic Moko or Rock Outcrop	Bluestem, Missouri Coneflower Dolomite Glade	Can range onto protected aspects, many uniqueglade species
8 Protected Variable Depth to Dolomite Units	s							
8.1 Cherty Protected Variable Depth to Dolomite Units	υ	O	CR	UG,LG,EM Backslopes	316-135	Variable depth, very gravelly, alfic Alred, Reuter, Arkana, Gepp	Mixed Oak-Sugar Maple/Redbud Dry-mesic Dolomite Forest	Similar to 8.2, but less rich and mesic
8.2 Non Cherty Protected Variable Depth to Dolomite Units	R	Ü	C R	LG,EM Backslopes	316-135	Variable Depth, mollic Gasconade, SND	Mixed Oak-Hardwood/Spicebush Mesic Dolomite Forest	Very rich, dense shrub and groundflora layers.
9 LG/EM Benches/Shoulder Ridges								
9.1 Ultic LG/EM Benches/Shoulder Ridges		C	R C	LG Benches/Sh. Ridges	Any	Deep, gravelly, ultic Bendavis, Clarksville, Tonti	Pine-Oak/Vaccinium Dry Ultic Woodland	More closed and productive than 1.1, 2.1, 3.1
9.2 Alfic LG/EM Benches/Shoulder Ridges		C	R C	LG Benches/Sh. Ridges	Any	Deep, very gravelly, alfic Alred, Rueter, Mano	Mixed Oak (White,Red)/Dogwood Dry-mesic Alfic (Cherl) Forest	Mix of upland generalists and alfic species
10 Footslopes (No Current Phases)	R	O	C C	Footslopes All Geologic Strata	Any	Deep. gravelly, affic or ultic Pomme, SND	Mixed Oak (White, Red)/Dogwood Dry-mesic Alfic (Chert) Forest	Ussually small and isolated: dense mix of upland generalists and alfic species

Field Stop #1: Missouri Ozark Forest Ecosystem Project (MOFEP)



Missouri Ozark Forest Ecosystem Project Soil Map









Missouri Ozark Forest Ecosystem Project Brief Map Unit Description

Reynolds County, Missouri

Map unit: 73139 - Poynor-Clarksville-Scholten complex, 8 to 15 percent slopes, stony

Poynor soils are formed from gravelly slope alluvium derived from cherty limestone over clayey residuum weathered from dolomite and occur on the shoulder, backslope of hillsides. The surface water runoff class is low and the natural drainage condition of the soil is well drained. The slowest permeability is moderately slow. The available water capacity for plants is low and the soil has a moderate shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This map unit is assigned to the non-irrigated land capability classification 4e.

Clarksville soils are formed from gravelly slope alluvium derived from cherty limestone over clayey residuum weathered from dolomite and occur on the summit, backslope of hillsides. The surface water runoff class is medium and the natural drainage condition of the soil is somewhat excessively drained. The slowest permeability is moderately slow. The available water capacity for plants is low and the soil has a low shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This map unit is assigned to the non-irrigated land capability classification 4e.

Scholten soils are formed from gravelly slope alluvium derived from cherty limestone over clayey residuum weathered from dolomite and occur on the shoulder, summit of hillsides. The surface water runoff class is very high and the natural drainage condition of the soil is moderately well drained. The slowest permeability is very slow. The available water capacity for plants is low and the soil has a low shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 15 inches. This map unit is assigned to the non-irrigated land capability classification 4e.

Map unit: 73140 - Clarksville-Scholten complex, 15 to 45 percent slopes, very stony

Clarksville soils are formed from gravelly slope alluvium derived from cherty limestone over clayey residuum weathered from dolomite and occur on the backslope of hillsides. The surface water runoff class is medium and the natural drainage condition of the soil is somewhat excessively drained. The slowest permeability is very slow. The available water capacity for plants is low and the soil has a low shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This map unit is assigned to the non-irrigated land capability classification 6e.

Scholten soils are formed from gravelly slope alluvium derived from cherty limestone over clayey residuum weathered from dolomite and occur on the backslope of hillsides. The surface water runoff class is high and the natural drainage condition of the soil is moderately well drained. The slowest permeability is very slow. The available water capacity for plants is low and the soil has a low shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 32 inches. This map unit is assigned to the non-irrigated land capability classification 7e.

Map unit: 73155 - Gasconade-Rock outcrop complex, 3 to 35 percent slopes

Gasconade soils are formed from gravelly residuum weathered from dolomite and occur on the summit of hillsides. The surface water runoff class is very high and the natural drainage condition of the soil is somewhat excessively drained. The slowest permeability is moderately slow. The available water capacity for plants is very low and the soil has a high shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This map unit is assigned to the non-irrigated land capability classification 6s.

Missouri Ozark Forest Ecosystem Project (MOFEP)

Soil Pit #1 - Rueter Series

Speaker: John Preston (JP) -- Soil Scientist/Team Leader -- USDA/NRCS

Rueter- another 3R soil – Rough, Red, Rocky; taxonomy of the series; soil assets & liabilities; how Rueter grew out of the old Clarksville series concepts and how modern soil surveys now are separating out competing/similar series such as Alred, Bendavis, Coulstone, Mano, Poynor; lab data, typical properties and anomalies.

Notes:

Soil Pit #1 - Forestry Management

Speaker: John Kabrick -- Research Forester (Silviculture/Forest Soils) -- Northern Research Station, USDA Forest Service

- Moderate biodiversity
- Moderate timber productivity
- Good oak regeneration potential; moderate pine regeneration potential
- Potential to manage as oak-pine woodland with thinning/harvesting and fire

Notes:

Pit #1: Reuter backslope: South facing (ELT 3.1/3.2).

John Preston, Soil Scientist Team Leader NRCS John Kabrick, Research Forester, USFS (Forest management implications)

Natural community: Dry and dry-mesic woodland

Ground flora indicators: Vaccinium (blueberry), Lespedeza, and Desmodium (tick trefoil) species groups

Trees and shrubs \geq 3.3 feet tall.

Species	Basal area	Trees per acre	Mean dbh
	$ft^2 ac^{-1}$		inches
Black oak	29.1	30	11.1
White oak	25.7	70	6.6
Shortleaf pine	16.6	29	9.5
Scarlet oak	10.2	46	2.6
Black hickory	7.3	65	3.0
Mockernut hickory	5.4	57	3.4
Flowering dogwood	4.5	393	1.1
Blackgum	3.3	235	1.0
Post oak	1.4	3	8.2
Pignut hickory	1.0	45	1.5
Red maple	0.9	8	2.5
Sassafras	0.3	104	0.4
Serviceberry	0.1	1	3.7
White ash	< 0.1	8	0.8
Sugar maple	< 0.1	1	1.8
Rusty blackhaw	< 0.1	13	0.1
Total	105	1108	

Productivity

Species	Site index ₅₀
Black oak	64
Scarlet oak	68
White oak	62
Shortleaf pine	65

Missouri Ozark Forest Ecosystem Project (MoFEP)

Soil Pit #2 - Gatewood Series

Speaker: Dennis M. Meinert -- Soil Scientist -- Missouri Department of Natural Resources

This soil represents a soil series common to the Ozark Highlands called Gatewood. The profile has some anomalies to the official series but it is close. It occurs on geologic formations dominated by dolomite, usually with low chert contents. The parent materials are gravelly pedisediments over clayey pedisediments and/or clayey residuum. Base saturation and pH are usually lowest in the surface and increase with depth. Nutrient supplying capacity is moderate and water supplying capacity is very low to low with less than 4 inches of available water. These soils are moderately well drained and permeability is slow. Iron depletions can be found in the horizons above the bedrock indicating periodic saturation during the winter and spring. This soil is usually mapped in conjuction with shallower soils such as Gasconade or Moko and rock outcrop. This soil has root limiting layers from both the clay and bedrock. Many of these soils, especially when they are in conjuction with the shallower soils and bedrock, have high organic carbon content due to past development under grass vegetation.

Notes:

Soil Pit #2 - Forestry Management Implications

Speaker: Timothy (Tim) A. Nigh -- Resource Scientist -- Missouri Department of Conservation

The Exposed Variable Depth to Dolomite ELT supports a glade/woodland complex with many unique plant and animal species. Trees are rather short and limby (35-45 ft), so timber resources are minimal. These complexes normally have three phases based on variation in soils and vegetation. The middle, glade part of the unit has very shallow soil with frequent bedrock outcrops. It is a grassland with scattered trees with many species confined to these conditions. Above the glade unit, soils are moderately deep (20-40") and very cherty. They support a woodland dominated by post oak, along with black oak, pine, black hickory and a variety of other tree species. The ground flora consists of numerous sun-loving legumes, asters and grasses. Below the glade, soils are also moderately deep, but are relatively chert free and mollic. They support a woodland dominated by Chinquapin oak and eastern red cedar, along with white ash, red oak, and occasionally sugar maple. This woodland also has numerous sun loving grasses and forbes. The entire complex provides the opportunity for open to semi-open habitat management using prescribed fire. Fire will thin the understory and provide increased sunlight to the diverse ground flora, often causing a dramatic response in diversity and cover.

Notes:

Pit #2: Variable depth unit, south facing (ELT 7.1).

Dennis Meinert, Soil Scientist MDNR Tim Nigh, Research Scientist, MDC (Forest management implications).

Natural community: Dry dolomite woodland

Ground flora indicators: Smilax (greenbriar) and Silphium (prairie doc) species groups

Trees and shrubs \geq 3.3 feet tall.

Species	Basal area $ft^2 ac^{-1}$	Trees per acre	Mean dbh inches
Post oak	38.8	158	5.3
Eastern redcedar	22.6	62	8.0
Shortleaf pine	9.1	37	6.2
White ash	5.8	107	2.3
Winged elm	5.5	145	1.8
Scarlet oak	4.1	113	1.0
Black hickory	2.7	33	3.3
Redbud	1.7	405	0.6
Gumbumelia	0.9	72	1.0
Carolina buckthorn	0.3	65	0.5
Flowering dogwood	0.1	105	0.3
Persimmon	0.1	5	1.6
Rusty blackhaw	< 0.1	50	0.2
Sassafras	< 0.1	25	
Red elm	< 0.1	25	
Total	92	1407	

Productivity¹

Species	Site index ₅₀
Black oak	58
Scarlet oak	60

¹Data are from Nigh and others. 2000. An ecological classification system for the Current River Hills Subsection. Missouri Department of Conservation.

Missouri Ozark Forest Ecosystem Project (MOFEP)

Soil Pit #3—Rueter Series

Speaker: Dick Henderson -- Soil Scientist -- Missouri Department of Natural Resources

- landform-parent material relationships of the area represented by the pit
- lab data including base saturation, coarse fragment content, texture, ph, etc. i.e., the morphology of the pit and how it influences the surrounding vegetation.

Notes:

Soil Pit #3 - Forestry Management Opportunities

Speaker: John G. Tuttle -- Forestry Field Program Supervisor -- Forest Products

ELTps 6.2 are dry-mesic sites that are good for growing healthy trees. This phase has a moderate to high species richness in the understory. These sites really tend to favor white oak because of the Alfic phase but red oak species will do well. Woody and herbaceous species such as Spicebush, Carolina Buckthorn, Sassafras, Red Bud, and Black Cohosh are common. Plant species such as Ginseng, Golden Seal, Ginger, Showy Lady Slipper, and Bloodroot favor this type of site.

This site is high in timber productivity. Forest industry identifies this site as a good quality timber growing area. Foresters commonly think of an ELTp 6.2 as a very productive site for Natural Community management. Foresters also know that if some sunlight is not allowed to hit the forest floor well before a major disturbance occurs tree regeneration will be difficult.

Overall this is an outstanding forest site for both tree growth and diverse plant compositions. A timber harvest that is not well planned on this site would allow for a dense understory of Carolina Buckthorn and tree regeneration would be difficult.

Notes:

Pit #3: Rueter Backslope: North facing (ELT 4.2).

Dick Henderson, Soil Scientist, DNR John Tuttle, Forest Products Specialist, MDC (Forest management implications).

Natural community: Dry-mesic forest

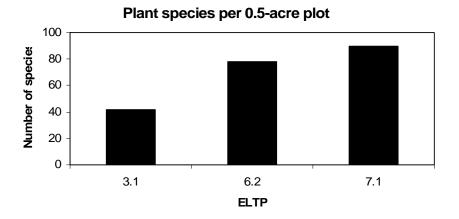
Ground flora indicators: Cimicifuga (cohosh), Desmodium (tick trefoil), and Smilacena (false Solomon's seal) species groups

Trees and shrubs \geq 3.3 feet tall.

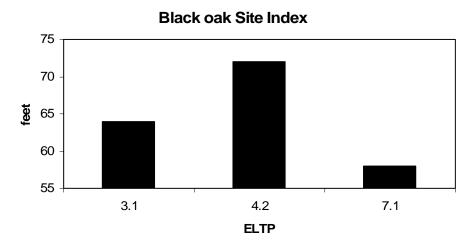
Species	Basal area $ft^2 ac^{-1}$	Trees per acre	Mean dbh
C1 1		20	inches
Scarlet oak	28.9	20	16.0
White oak	26.5	80	6.9
Black oak	19.9	13	16.2
Blackgum	7.2	103	1.4
Black hickory	5.9	18	6.8
Flowering dogwood	5.6	336	1.4
Pignut hickory	3.5	41	2.9
Shortleaf pine	3.2	4	12.8
Mockernut hickory	2.0	18	3.1
Black walnut	1.6	3	8.2
Northern red oak	1.4	2	12.9
Red maple	1.4	215	0.4
Post oak	0.4	3	3.8
Sugar maple	0.4	5	3.9
Sassafras	0.2	34	0.2
Red elm	0.2	1	6.0
Redbud	0.2	60	0.3
Hackberry	0.1	1	6.8
White ash	< 0.1	31	0.1
Black cherry	< 0.1	13	0.1
Spicebush	< 0.1	131	
Red mulberry	< 0.1	13	
Serviceberry	< 0.1	6	
Hornbeam	< 0.1	6	
Bitternut hickory	< 0.1	6	
Total	108	1163	

Productivity

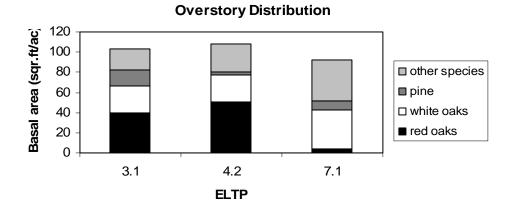
Species	Site index ₅₀
Black oak	72
Scarlet oak	69
White oak	67
Shortleaf pine	64



• Species richness (including ground flora) is highest in the Dry Dolomite Woodland (ELTP 7.1) and lowest in the Dry-mesic Woodland (ELTP 3.1).



• Site productivity is greatest in the Dry-mesic Forest (ELTP 6.2).

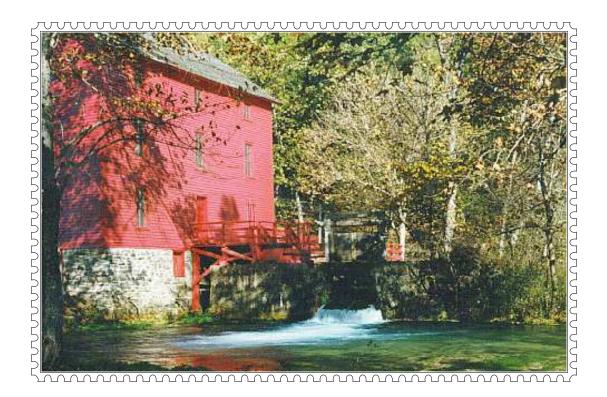


• Tree species composition differs among ELTPs. Shortleaf pine is more abundant in Dry and Dry-mesic Woodlands; Post oaks (white oak group) and the group "other species" are more abundant in Dry Dolomite Woodlands.

Welcome to Alley Spring!

Alley Spring is located 6 miles west of Eminence in Shannon County. It is the 7th largest spring in Missouri with a 60 foot turquoise colored spring pool. The spring branch flows for a half mile before meeting the Jack's Fork River where it dumps an average of 81 million gallons of water per day. Alley Spring is home to an old grist mill that was built in 1894. The mill can be toured and is open from Memorial Day through Labor Day. In addition to the mill, visitors can enjoy two walking trails. A 1.5-mile trail offers a scenic view and a .3-mile trail passes bluffs and the spring branch. While on the trails, hikers will see a variety of vegetation and may also see critters like mink, muskrat and banded water snakes swimming in the spring. Swallows are known to nest along the bluffs during the summer months, while Eagles are seen during the winter. Swimming and fishing in Alley Spring is highly discouraged.

http://www.nps.gov/ozar/history.htm http://www.ouraaa.com/traveler/0307/day springs m.html?zip=65101



Alley Spring Facts:

- Rises in a deep basin at the base of a bluff of Eminence Dolomite
- Spring and grounds were formerly Alley Spring State Park, now part of the Ozark National Scenic Riverways
- Grist mill was used to ground meal and flour, cattle feed, as a saw mill and provided electrical power
- Records of flow have been collected from October 1929—October 1939 and October 1965 to present.

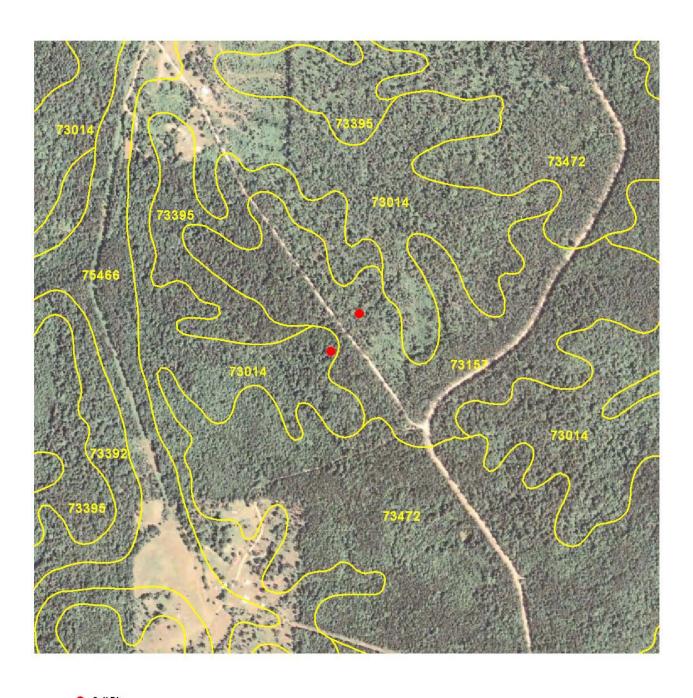
Maximum flow March 11, 1935 685 million gallons
 Minimum flow October 15-18, 1934 35 million gallons per day
 Average flow 16 year record 81 million gallons per day

Field Stop #2:

Hwy DD Savanna Site

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Hwy DD Savanna Site Soil Map









Hwy DD Savanna Site #1

Soil Pit #1 - Fanchon Series

Speaker: Timothy Knoernschild -- Soil Scientist -- Missouri Department of Natural Resources

The soil represented by this pit occurs on gently sloping areas. It has lithologic discontinuities within the profile. The discontinuities are from the different materials in which the soil has formed. The underlying geology is Roubidoux, which in this area is dominantly sandstone. The formation also has dolomite and chert beds within its lithology. The surface horizons of the soil are in silty sediments that have loess as a major component of the materials. The underlying materials that the soil formed in are from residuum that has weathered from the bedrock, and from erosional episodes that have placed the pedisediment to create the current soil profile.

The Fanchon series was mapped with the Tonti series until it was set up as a separate soil series because of geomorphic and classification differences. The significant difference is the absence of a fragipan in the Fanchon series. The map unit that is on the current soil maps is Captina. The Captina varies from the Tonti in particle size family: fine-silty versus fine-loamy, respectively. Otherwise, all of the soils in the uplands in this area are Udults, low base saturation. And, of course, the Fanchon soil identified in the pit does not have the fragipan that the Captina soil has. The Fanchon soil also has a higher percentage of sand and gravel than does the Captina.

These soils have variability in depth to the discontinuities due to variability in the thickness of depositions of sediments and severity and extent of succeeding erosion. The differences among the soils on these landscapes is also tied rather closely to the underlying geology. Many of the soils have their properties inherited from the type and chemical nature of the geologic material that the soils have weathered into. Often soils are mapped in complexes due to the variability over short distances that result in different soils that are not easily separated at the scale of soil survey. As different scales of mapping are being used, soils that are in complexes or that were inclusions, may now be mapped in separate map units. Another factor is the use of transects to identify the different soils that are present within a map unit.

Notes:

Development of a Pine Woodland

Speaker: Dave Moore -- Forest Botanist -- Mark Twain National Forest

Historically, shortleaf pine woodlands covered about 620,000 acres of the Missouri Ozarks, and the core of these woodlands were an almost continuous swath of shortleaf pine covering about 380,000 acres in Carter, Reynolds and Shannon counties. Schoolcraft's accounts from 1818-1819 discuss grasslands, oak savannahs, mixed oak-pine woodlands and large pine woodlands and forests. By 1913 most of the virgin pine and oak-hickory forests of the Ozark region were gone. Settlers moved in and tried to farm the land but eventually gave up by the 1930s. At the time of the first Missouri forest inventory in 1947, less than 27 percent of the Mark Twain was in forested areas where sawtimber-sized tree predominated. Much of the land was scarred by abandoned farms and large wildfires on cut over lands. The primary changes between 1819 and today are that fertile prairies have been cultivated; many of the poor prairies, barrens, and open woodlands have grown more woody and dense due to fire suppression; and most large bottomland forest areas have been inundated by damns or converted to pasture or croplands.

Today, many of the former shortleaf pine woodlands are overstocked with dense stands of white oak, black oak, scarlet oak and red oak. Owing to this, a prominent theme of the Mark Twain National Forest is restoration of these shortleaf pine woodlands, primarily through the use of prescribed fire and mechanical thinning.

At this stop we will be able to see the difference between two pine woodlands; one that is undergoing restoration and one that is not. The first site, called DD Savannah, has undergone at least 15 years of aggressive restoration involving prescribed fire and mechanical thinning. There is already a noticeable response in the herbaceous vegetation at this site, with an abundance of conservative plant species typical of a high-quality shortleaf pine woodland. The second site is a typical overstocked stand of shortleaf pine intermixed with various oaks. It has a dense canopy with a sparse herbaceous layer typical of many Ozark uplands. Discussion of restoration techniques and the effects on soils and vegetation will be the purpose of this stop.

Notes:

Hwy DD Savanna Site #1

Double D savanna comprises Stands Nos. 53 & 54 of Compartment 266, Eleven Point District, Mark Twain National Forest. Stand data for No. 53 (CDS data base) is as follows:

Stand No. 53:

Approximate acreage: 8 acres

Forest type: Oak-pine

Vegetation type: Oak-pine (pine 25 – 50 %)

Animal habitat type: Immature deciduous-coniferous upland

Ecological land type: Limestone side slope: Northeast aspect, > 8 percent slope

Size density: Seedling-sapling stage plus cover – over 70%

Stand condition: Immature

Management objective: maintain present type

Stand DBH: 1 "

Site index: 63

Year of origin: 1982

Past activity:

Stand clear cut - 1981

Site prep (other than burning or chemicals) – 1982

Stocking surveys - 1983 and 1985

Natural regeneration with site prep – 1985

Burns - 1992, 1994, 1996, 2000, 2003

Wildlife seeding - 1996

Fuels management - 1998

Stand on the other side of the road did not receive treatments for ecological restoration (Stand No 57, of Compartment 266, Eleven Point District, Mark Twain National Forest. Stand data for these stands (CDS data base) is as follows:

Forest type: Black oak, scarlet oak, hickory

Vegetation type: Black oak, white oak, hickory (shortleaf pine may also occur)

Animal habitat type: Mature deciduous upland (open understory)

Ecological land type: Limestone side slope: Northeast aspect, > 8 percent slope

Basal area: 90

Size density: Saw-timber stand – B level of stocking (70 % or more)

Stand condition: Low quality

Management objective: maintain present type

Stand DBH: 12 "

Site index: 52

Year of origin: 1914

Hwy DD Savanna Site #1 Brief Map Unit Description

Shannon County, Missouri

Map unit: 73014 - Clarksville very gravelly silt loam, 8-15 percent slopes

Clarksville soils are formed from gravelly slope alluvium derived from chert over gravelly residuum weathered from dolomite and occur on the shoulder of hillsides. The surface water runoff class is low and the natural drainage condition of the soil is somewhat excessively drained. The slowest permeability is moderately rapid. The available water capacity for plants is low and the soil has a high shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This map unit is assigned to the non-irrigated land capability classification 6e.

PEDON INFO HERE

Hwy DD Savanna Site #2

Soil Pit # 2 - Clarksville Series

Speaker: Leon Thompson -- Soil Scientist -- Missouri Department of Natural Resources

The Clarksville series consists of very deep, somewhat excessively drained soils formed in residuum and locally transported colluvial-alluvial materials from cherty dolomite or cherty limestone on steep side slopes and narrow ridgetops. Slope gradients range from 1 to 60 percent. Most of the soil is in second growth timber similar to the original forest. SERIES ESTABLISHED: Montgomery County, Tennessee,1901. TYPE LOCATION: Reynolds County, Missouri; 50 feet northeast of center of Missouri Route 21; 1,400 feet west and 2,800 feet south of the northeast corner, sec. 5 T. 31N, R. 1 E.

Notes:

Forestry Management Implications

Speaker: John Depuy -- Soil Scientist -- Mark Twain National Forest

Those of us involved in natural resource management are no strangers to paradigm shifts. When I was beginning my career in forestry nearly 30 years ago, the over-riding concern of both old hands and new recruits was getting the cut out (meaning of course the timber cut). Resource protection came in for some share of attention but timber sales and revenue was the main focus, whether in public agencies or private companies. A decade later, concerns were raised about the effect "getting the cut out" was having on forest land species (such as the spotted owl in the west and the Indiana bat in the Midwest), watershed protection, and the forest landscape as a whole. New paradigms were introduced to address these concerns such as "new forestry", biodiversity, and ecosystem management. For those of us trained in maximum fiber production, these new paradigms were quite a stretch.

Ecosystem management was adopted on the Mark Twain National Forest and other places. This led into ecological restoration. A reference condition was established (generally pre-European settlement condition or what was thought to be pre-European settlement condition) and that became the desired future condition (DFC). Such conditions included the pine-bluestem savanna and pine-oak savanna plant communities. Going from a present condition (usually oak-hickory forests) to some DFC required figuring out how this can be done.

Silviculture, as many foresters learned, is the art and science of manipulating forest stands to meet the objectives of the owner. The owner in the present case is the Mark Twain National Forest and the objectives are spelled out in the recently completed Forest Plan Revision. In that plan, up to one-third of the Forest will have management prescriptions designed to bring those plant communities to ecological restoration provided budget and resources allow it.

Many of us learned the silviculture of maximizing timber production and later meeting the needs of other non-timber resources. Many of the same silvicultural tools in the forester's tool box (including prescribed burning and thinning) can be used in ecological restoration. The DD savanna is an example of using these tools to create a pine-oak savanna and what can happen when they are. These tools have been used over the past fifteen years. DD savanna is not a finished product but a work in progress. More treatments and time will be required to keep this plant community on course toward the DFC.

Will these silvicultural tools bring this savanna and other plant communities to DFC? We're in the process of finding out. Will this result in sustainable resources and sustainable forests? Will this result in healthier, more resilient ecosystems? We trust this will happen but we don't for sure that it will. It will likely be those who come after us who will have the answers to those questions.

Notes:

Hwy DD Savanna Site #2 Brief Map Unit Description

Shannon County, Missouri

Map unit: 73157 - Captina silt loam, 3 to 8 percent slopes

Captina soils are formed from loess over loamy slope alluvium over residuum weathered from cherty limestone and occur on the summit of hillsides. The surface water runoff class is medium and the natural drainage condition of the soil is moderately well drained. The slowest permeability is slow. The available water capacity for plants is moderate and the soil has a moderate shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 21 inches. This map unit is assigned to the non-irrigated land capability classification 3e.

Hwy DD Savanna Site #2

Double D savanna comprises Stands Nos. 53 & 54 of Compartment 266, Eleven Point District, Mark Twain National Forest. Stand data for No. 54 (CDS data base) is as follows:

Stand No. 54

Approximate acreage: 7 acres Forest type: Shortleaf pine

Vegetation type: SameAnimal habitat type: Mature coniferous upland Ecological land type: Limestone and sandtonbe flat: 0 – 8 percent slope

Basal area: 80

Size density: Sawtimber stand – less than C level of stocking of 16 – 39 %)

Stand condition: Uneven-aged

Management objective: maintain present type

Stand DBH: 10 "

Site index: 60

Year of origin: 1938

Past activity:

Commercial thinning – 1996

Natural regeneration with site prep – 1985

Burns - 1987, 1992, 1994, 1996, 2000, 2003

Wildlife seeding - 1996

Fuels management - 1998

Stand on the other side of the road did not receive treatments for ecological restoration (Stand No 57, of Compartment 266, Eleven Point District, Mark Twain National Forest. Stand data for these stands (CDS data base) is as follows:

Forest type: Black oak, scarlet oak, hickory

Vegetation type: Black oak, white oak, hickory (shortleaf pine may also occur)

Animal habitat type: Mature deciduous upland (open understory)

Ecological land type: Limestone side slope: Northeast aspect, > 8 percent slope

Basal area: 90

Size density: Saw-timber stand – B level of stocking (70 % or more)

Stand condition: Low quality

Management objective: maintain present type

Stand DBH: 12 "

Site index: 52

Year of origin: 1914

Past activity: N.A.

PEDON INFO HERE

PEDON INFO HERE

Welcome to Big Spring!

Big Spring is located near the town of Van Buren in Carter County. It is the largest spring in Missouri and one of the largest in the world. The water flows from the base of a dolomite bluff at an average of 276 million gallons of water per day and feeds the Current River. The nearby park offers rustic cabins and a lodge built in the 1930's by the Civilian Conservation Corps. Camping, fishing canoeing and hiking are the most popular activities.



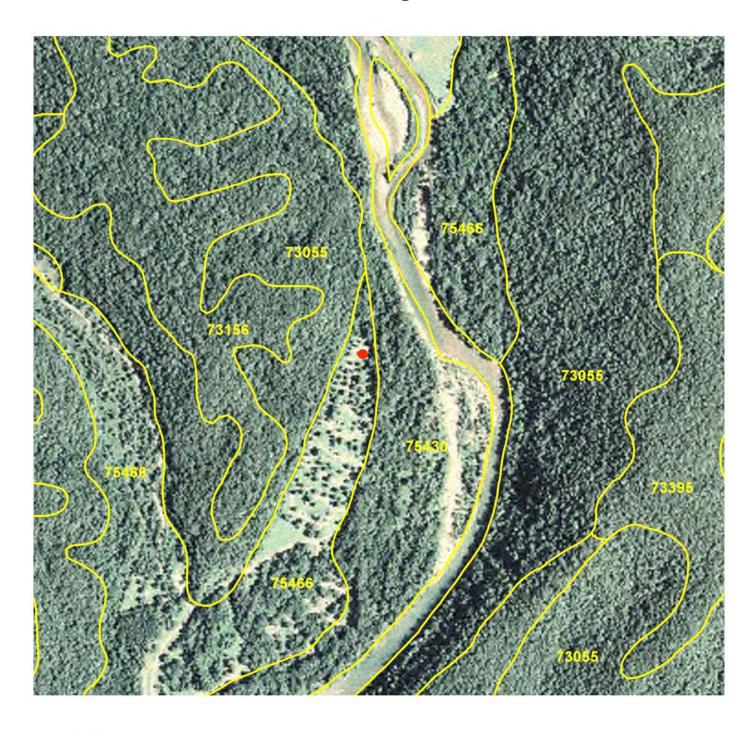
Big Spring Facts:

- Largest Spring in the Ozark Region of Missouri and Arkansas
- Big Spring area was formerly Big Spring State Park but was inducted into the Ozark National Scenic Riverways on June 10, 1972.
- Flow records have been collected since 1921. During this period (1921-1970), the spring averaged as follows:

•	Maximum	June 1928	840 million gallons
•	Minimun	October 6, 1956	152 million gallons
•	Average	49 year record	276 million gallons per day

Field Stop #3: National Ozark Scenic Riverways, Big Spring

Ozark National Scenic Riverways - Big Spring Soil Map









Ozark National Scenic Riverways - Big Spring

Soil Pit - Soils

Speaker: Dr. Michael Aide

The Sandbur series (Coarse-loamy, siliceous, superactive, nonacid, mesic Mollic Udifluvents) consists of very deep, somewhat excessively drained soils that formed in loamy alluvium on flood plains along streams of intermediate size. A typical Sandbur profile appears as an Ap-C1 to C6 horizon sequence consisting of loamy to sandy textures having a moderately acid to moderately alkaline pH. The examined pedon has an A-C-2ABb-2Cb-3ABb-3Btb horizon sequence. The cation exchange capacity is low to very low, suggesting that this soil has a limited buffer capacity and frequent nutrient applications are required. The soil reaction is neutral in the surface and slightly acid in the deeper soil horizons. Nitrogen may be easily removed from the soil because of nitrate leaching. The limited soil organic matter contents suggest that mineralization will supply only limited amounts of nitrogen and phosphorus.

Notes:

Bottomland Reforestation

Speaker: Tim Breen - Terrestrial Ecologist - Ozark National Scenic Riverways, National Park Service

Overview of the restoration of bottomland hardwoods on open fields within Ozark National Scenic Riverways:

- There are approximately 2500 acres in open fields, most of which are managed through a permit system, where hay is cut in the summer.
- The Resource Management staff is in the process of preparing a restoration plan for the open fields. Restoration decisions will be made based on data from the Ecological Classification System, recent vegetation mapping of the park, soils data, cultural significance of certain fields, landscape position, flooding frequency, etc.

At the site

- overview of the open fields plan
- describe the potential for restoring this site or a similar site

(if time permits) describe the specific restoration activities that would take place in a typical open field

Notes:

National Ozark Scenic Riverways, Big Spring Brief Map Unit Description

Carter County, Missouri

Map unit: 75466 - Midco very gravelly loam, 0 to 3 percent slopes, occasionally flooded

Midco soils are formed from gravelly alluvium and occur on the toeslope of hillsides. The surface water runoff class is very low and the natural drainage condition of the soil is somewhat excessively drained. The slowest permeability is moderately rapid. The available water capacity for plants is low and the soil has a low shrink swell potential. This soil is occasionally flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This map unit is assigned to the non-irrigated land capability classification 4s.

Tree Information for Big Springs Soil Pit Central States Forest Soils Workshop Evaluator: Randy Jensen 06/27/06

Basal area: 87.5 square feet / acre

Trees / acre: 313

Average DBH: 7.2 inches

Basal area of trees \geq 9 inch DBH: 53 square feet / acre

Site index: suitable site index trees not available

Species Information:

Species	BA/ acre	# / acre
Hackberry	23	83
Sycamore	20	7
Honey locust	8	11
Pin oak	8	3
American Elm	8	10
Other Species	20.5	199^{1}

Other species in 4 prism plots:

Sugar maple

Boxelder maple

Winged elm

Red elm

Burr oak

Bitternut hickory

Ironwood

Pawpaw

Other species in map unit:

Green ash

Cottonwood

Chinkapin oak

Rough-leaved dogwood

Musclewood

Spicebush

Other info: wild cane growing at north end of map unit along river. 9 snags / acre (10-18 inch DBH) and 1 snag / acre (>19 inch DBH)

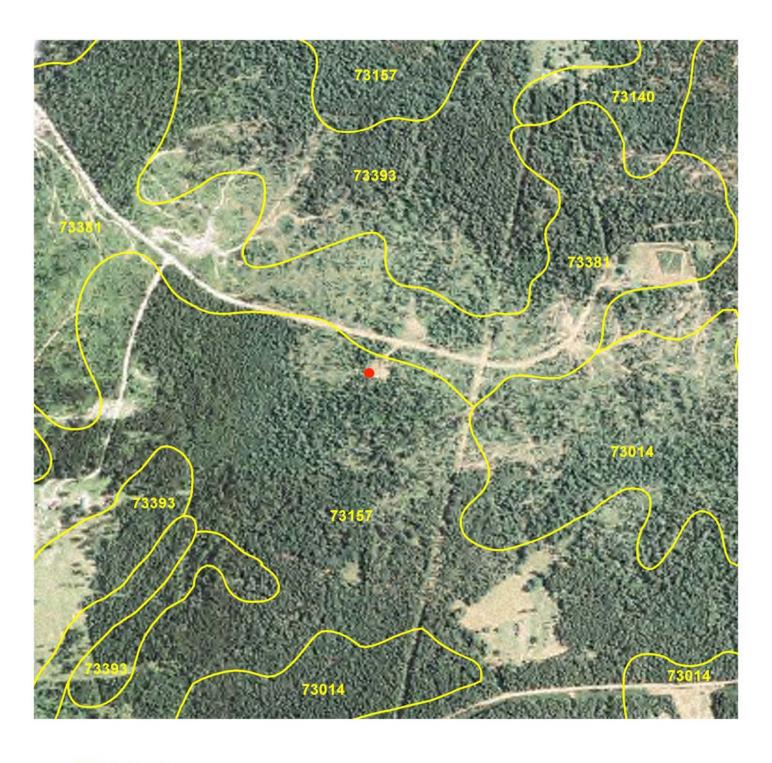
¹one 2" pawpaw and 4, four inch trees in prism plots may have inflated tree numbers.

Big Springs Tree Inventory

STANDNO	PLOTNO	SPECIES	SPP	DBH	COND
1	1	823	bur oak	4	1
1	1	318	sugar maple	8	1
1	1	975	red elm	6	1
1	1	830	pin oak	30	1
1	1	552	honeylocust	16	1
1	1	731	sycamore	28	1
1	1	313	boxelder maple	14	1
1	1	999	snag	24	5
1	1	731	sycamore	22	1
1	1	731	sycamore	24	1
1	2	972	American elm	10	1
1	2	462	hackberry	4	1
1	2	552	honeylocust	10	1
1	2	552	honeylocust	10	1
1	2	999	snag	10	5
1	2	313	boxelder maple	22	1
1	2	999	pawpaw	2	1
1	2	462	hackberry	22	1
1	2	731	sycamore	26	1
1	2	462	hackberry	10	1
1	3	830	pin oak	32	1
1	3	999	snag	12	5
1	3	701	ironwood	4	1
1	3	462	hackberry	10	1
1	3	731	sycamore	24	1
1	3	971	winged elm	12	1
1	3	402	bitternut hicko	20	1
1	4	462	hackberry	16	1
1	4	830	pin oak	14	1
1	4	731	sycamore	20	1
1	4	731	sycamore	32	1
1	4	462	hackberry	10	1
1	4	972	American elm	16	1
1	4	462	hackberry	14	1
1	4	462	hackberry	8	1
1	4	972	American elm	12	1
1	4	999	snag	18	5
1	4	462	hackberry	4	1
1	4	731	sycamore	22	1

Field Stop #1: Project Tornado

Project Tornado - Ellsinore Soil Map









Mark Twain National Forest Poplar Bluff Ranger District

PROJECT SUMMARY

Restoration and Other Activities Associated with Project Tornado

Background

On April 24, 2002, a tornado cut diagonally across the Poplar Bluff Ranger District for a distance of 23 miles. Another tornado touched down on the Potosi-Fredericktown Ranger District for approximately 14 miles. Both tornados had sustained winds of 207-260 mph.

The tornados created major alterations to fuel accumulations (fuel loads) Whole trees were up-rooted, tops broken off, and stems splintered. Fuel loads increased from five to twenty-five times pre-tornado fuel loading conditions. Fuel loading ranges from 12-22 tons/acre for 100-hour fuels and from 35-78 tons/acre for 1000-hour fuels. The post-tornado fuels are in an almost continuous bed with a deep, loosely arranged mix of light, medium, and heavy fuels. The fuels are arranged in a continuous horizontal layer with few breaks except for cleared roads and areas that have been salvaged. All fuels on or near the ground are available to carry a fire. Normally, this means only the leaf litter/pine needles/small shrubs with fuel loadings of around 2 tons/acre. Under pre-tornado fuel conditions, heavy fuels existed, but in low quantities and scattered sparsely across the forest floor. When fire hit them, it usually did not ignite the entire log, and may have gone out entirely depending on how moist the log was. Under pre-tornado extreme or drought conditions however, these large logs would fully ignite.

Such fuel conditions create the potential for severe forest fires that could have a significant effect on the health and safety of the public and firefighters. State and county roadways are at risk of receiving heavy smoke resulting in unsafe conditions for vehicles, and private property and the citizens who live near or visit the area are at risk. The ability to respond to and safely suppress potential fires is severely decreased by the large fuel accumulations and the physical obstacles created by the downed trees.

The Forest Service has implemented actions that will over time, help reduce wildfire risks to acceptable levels, and restore these lands to more natural appearing forest. Actions include:

- Salvage logging, now complete, on the most heavily affected areas to reduce extreme fuel-loading conditions.
- Construction of over 41 miles of firebreaks, now complete, around the heaviest fuel-loading areas to protect valuable private property.
- **Prescribe burning** many of these areas multiple, periodic times over the next ten years to further reduce fuel-loading conditions.
- Planting native short-leaf pine and hardwoods to reforest these areas. Reforestation involves planting new trees to replace those that were blowndown. There are few, if any, trees remaining in those stands where large diameter fuels were removed. What seed tree sources that do remain are considered insufficient to reforest the area by natural regeneration.
- Site preparation and release treatments over the next ten years on an as needed basis to establish and maintain better growing conditions in the restored areas. Site prep involves using handtools and/or prescribed burning to remove undesirable trees so remaining trees will have less competition for nutrients and water.
- Restoration of over 15miles of the Victory Horse Trail and two trailhead accesses

Project Tornado - Ellsinore

Soil Pit - Soils

Speaker: Mike Cook -- Soil Scientist/Team Leader -- USDA/NRCS

General group discussion on important soil properties of the Tonti soil. Emphasis will be placed on the fragipan, base saturation and available water supplying capacity.

Notes:

Tornado area salvage and restoration discussion

Speaker: Robert (Bob) A. Harrell -- Forester/Silviculturist -- U.S. Forest Service

- Tornado event April 2002
- Environmental Analysis and Council of Environmental Quality
- Safety and fire hazard issues
- Timber salvage
- MTNF 2005 Forest Plan and Management Prescription 1.1 Restoration of Natural Communities

Notes:

Project Tornado—Ellsinore Brief Map Unit Description

Carter County, Missouri

Map unit: 73157 - Captina silt loam, 3 to 8 percent slopes

Captina soils are formed from loess over loamy slope alluvium over residuum weathered from cherty limestone and occur on the summit of hillsides. The surface water runoff class is medium and the natural drainage condition of the soil is moderately well drained. The slowest permeability is slow. The available water capacity for plants is moderate and the soil has a moderate shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 21 inches. This map unit is assigned to the non-irrigated land capability classification 3e.

Site ID: Name thi	s Site Here		Lab ID: MCL M0503509								
Special Project:	Forest Soils 2006	Soil Pits									
Description Date	: 3/23/2006		Print Date: 8/8/2	2006							
Describers Name	e(s): Michael Wya	tt, Leon Thompsor	, Dan Childress								
Site Notes: TORN	ADO SALVAGE AREA	1	Pedon Notes:								
Sampled Name:	CAPTINA - <u>View</u>	Correlated Name	:	Certification: Level 2							
Taxonomic Clas	sification: Fine-lo	amy, siliceous, act	ctive, mesic Typic Fragiudults								
Pedon Type: ma	p unit inclusion	Pedon Purpose: scription	e: full pedon de- Taxon Kind: Series								
SSURGO MU: 38	C - Captina silt loa	am, 5 to 9 percent	General Soil MU	J: MO051 - Clarksville-Captina-							
MLRA: <u>N116A</u> - 0	Ozark Highland		CRA: N116A.10	- Black River Ozark Border							
County/SSA: MC	0035 - CARTER, MO	, USA	7.5' Quad: 36090	0-H6 - Ellsinore, Missouri							
Lat/Long: 36° 54	' 53.4" N, 90° 41' 1	18.4" W	UTM: 705,917 E	, 4,087,920N NAD83 , Zone 15							
Legal: 2,573 ft Ea	ast and 824 ft Nort	h from the South V	Vest corner of S12	2, T26N, R3E of the 5th Principal							
US Phys Div: Inte	erior Highlands	US Phys Prov: O	zark Plateau	US Phys Sec: Springfield-Salem plateaus							
MO Eco Sec: OZ	- Ozark High-	MO Eco Subsec:	OZ14 - Black	MO LTA: OZ14a - Grandin Pine-							
Landscape: hills			Landform: ridge								
Geo Comp: Inter	fluve		Profile Pos: Sun	nmit: on middle third							
Elevation: 739 ft	Aspect: 240°	Slope: 6%	Shape: up/down	: Convex - across: Convex							
Flooding: none			Ponding: none								
Drainage: Mod- erately well drained	Runoff: Medium	Perm: Very slow	Ksat:	Erosion: Class 1 - Sheet erosion							
Observed Veg (Quercus stellata) , T		PIEC2- shortleaf pine		ARYA- hickory (Carya) , QUST- post oak um scoparium ssp. divergens) , RUBUS-							
Parent Materials: Strongly weathered, loamy, Holocene Stage pedisediment from mixed materials over strongly weathered, gravelly, Holocene Stage pedisediment from cherty limestone over strongly weathered, clayey, Roubidoux Formation pedisediment from limestone and sandstone											
Bedrock: N/A											
Geologic Formation: Paleozoic Era, Lower Ordovician, Canadian (Ibexian) Series, Elvins Group, Roubidoux Formation											

Diagnostic Horizons and Restrictions:

Ochric epipedon: 0 to 6 inches (0-15 cm) Argillic horizon: 6 to 70 inches (15-178 cm)

Particle Size Control Section: 6-26" (15-66cm); 24% Clay

Redox depletions with chroma 2 or less: 19 to 44 inches (48-112 cm)

Fragipan: 26 to 44 inches (66-112 cm) (Restriction)
Lithologic discontinuity: 26 to 44 inches (66-112 cm)
Lithologic discontinuity: 44 to 70 inches (112-178 cm)

Observation method: Small Pit

- **A** --- 0 to 2 inches (0-5 cm); dark grayish brown (10YR 4/2, moist) silt loam; weak fine subangular blocky structure; very friable; many very fine rootsthroughout, many fine rootsthroughout, few medium rootsthroughout, and few coarse rootsthroughout; many fine tubular moderate continuity, many medium tubular moderate continuity, common coarse tubular moderate continuity pores; clear smooth boundary.
- **E** --- 2 to 6 inches (5-15 cm); light yellowish brown (10YR 6/4, moist) silt loam; weak fine subangular blocky structure; very friable; common very fine rootsthroughout, common fine rootsthroughout, common medium rootsthroughout, and common coarse rootsthroughout; common fine tubular moderate continuity, common medium tubular moderate continuity pores; clear wavy boundary.
- **Bt1** --- 6 to 12 inches (15-30 cm); 60% strong brown (7.5YR 5/6, moist), and 40% yellowish brown (10YR 5/4, moist) silt loam; weak fine subangular blocky structure; friable; common very fine rootsthroughout, common fine rootsthroughout, common medium rootsthroughout, and common coarse rootsthroughout; common fine tubular moderate continuity, common medium tubular moderate continuity pores; few strong brown (7.5YR 5/6, moist) faint clay films on all faces of peds; gradual wavy boundary.
- **Bt2** --- 12 to 19 inches (30-48 cm); 90% strong brown (7.5YR 5/6, moist), and 10% yellowish brown (10YR 5/4, moist) silt loam; moderate medium subangular blocky structure; friable; common very fine rootsthroughout, common fine rootsthroughout, common medium rootsthroughout, and few coarse rootsthroughout; many very fine tubular moderate continuity, many fine tubular moderate continuity pores; few strong brown (7.5YR 4/6, moist) faint clay films on all faces of peds, few pale brown (10YR 6/3, moist) faint silt coats on all faces of peds; 1% subangular indurated gravel sized chert fragments; abrupt smooth boundary.
- **Bt3** --- 19 to 26 inches (48-66 cm); 65% yellowish brown (10YR 5/4, moist), and 35% strong brown (7.5YR 5/6, moist) silt loam; moderate medium subangular blocky structure; friable; few very fine rootsthroughout, few fine rootsthroughout, few medium rootsthroughout, and few coarse rootsthroughout; many very fine tubular moderate continuity, many fine tubular moderate continuity pores; few strong brown (7.5YR 4/6, moist) faint clay films on all faces of peds; common light gray (10YR 7/2, moist) medium distinct noncemented irregular iron depletions throughout with diffuse boundaries; 5% subangular indurated gravel sized chert fragments; abrupt wavy boundary.
- **2Btx1** --- 26 to 37 inches (66-94 cm); 70% pale brown (10YR 6/3, moist), and 30% brown (10YR 5/3, moist) very gravelly silt loam; weak very coarse prismatic structure; firm; few fine rootsthroughout, and few medium rootsthroughout; common fine interstitial moderate continuity, common medium interstitial moderate continuity, few coarse interstitial moderate continuity pores; few dark yellowish brown (10YR 4/6, moist) distinct clay films on rock fragments, common grayish brown (10YR 5/2, moist) distinct clay films on rock fragments; many light gray (10YR 7/1, moist) fine distinct clay depletions; 40% subangular indurated gravel sized chert fragments; Note(s): 60 percent brittleness estimate in the fragipan.; gradual wavy boundary.
- **2Btx2** --- 37 to 44 inches (94-112 cm); 60% pale brown (10YR 6/3, moist), and 40% yellowish brown (10YR 5/4, moist) very gravelly silt loam; weak very coarse prismatic structure; firm; few fine rootsthroughout, and few medium rootsthroughout; common fine interstitial moderate continuity, common medium interstitial moderate continuity, few coarse interstitial moderate continuity pores; few dark yellowish brown (10YR 4/6, moist) distinct clay films on all faces of peds, few brown (7.5YR 4/4, moist) prominent clay films on rock fragments; many light gray (10YR 7/1, moist) fine distinct clay depletions; 45% subangular strongly cemented gravel sized chert fragments, 5% subangular indurated cobble sized chert fragments; Note (s): 70 percent brittleness estimate in the fragipan.; gradual irregular boundary.
- **3Bt1** --- 44 to 54 inches (112-137 cm); 70% red (2.5YR 4/6, moist), and 30% light yellowish brown (10YR 6/4, moist) very cobbly clay; moderate medium subangular blocky parting to moderate fine angular blocky structure; firm; few fine root-sthroughout, and few medium rootsthroughout; common fine interstitial moderate continuity, common medium interstitial moderate continuity pores; common red (2.5YR 4/6, moist) faint clay films on all faces of peds, common yellowish brown (10YR 5/4, moist) faint clay films on all faces of peds; 25% subangular strongly cemented gravel sized chert fragments, 15% subangular indurated cobble sized chert fragments; gradual wavy boundary.
- **3Bt2** --- 54 to 70 inches (137-178 cm); 40% yellowish brown (10YR 5/4, moist), 30% reddish brown (2.5YR 4/4, moist), and 30% light yellowish brown (10YR 6/4, moist) very gravelly clay; moderate fine angular blocky structure; firm; few fine root-sthroughout; few fine vesicular moderate continuity pores; few red (2.5YR 4/6, moist) faint clay films on all faces of peds, common yellowish brown (10YR 5/4, moist) faint clay films on all faces of peds; 25% subangular strongly cemented gravel sized chert fragments, 10% subangular indurated cobble sized chert fragments.

Missouri Soil Characterization Laboratory Data

Partical Size Control Section Calculations:

Control Section: 10 - 40in (25 - 102cm)

CEC-7:Clay: **0.64**Clay: **4%**Sand (total): **68%** Sand (> 0.1mm): **66%** Silt (< 0.1mm): 9%

PSC Family:

Horizon within PSC Section Horizon partially within PSC Sec-

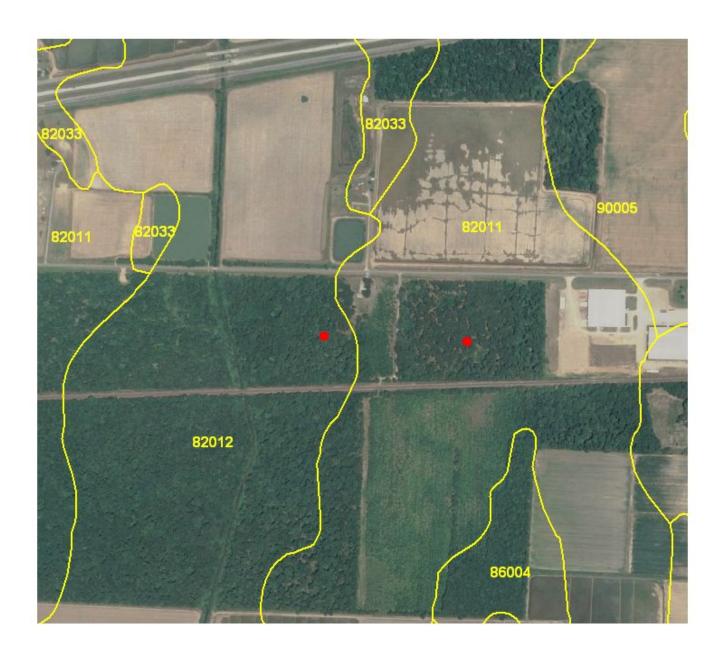
tion

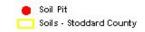
Missaur	DEPTH HORI- TOTAL SILT SAND												TEXT	SAND	SILT	SAND/
Missouri Soil Characterization Laboratory	(in)	ZON	CLAY <002	SILT .002- .05	SAND .05-2	FINE .002- .02	COARS E .0205	VF .0510	F .1025	M .255	C .5-1	VC 1-2	CLAS S	(Clay- free)	(Clay- free)	SILT (Clay- free)
Sample #																
M050350601	0-8	A1	15.6	52.8	31.6	33.7	19.1	6.7	18.0	5.4	1.3	0.3	SIL	37.4	62.6	0.60
M050350602	8-16	A2	13.9	41.5	44.6	25.0	16.5	7.2	29.2	6.3	1.7	0.3	L	51.8	48.2	1.07
M050350603	16-22	C1	5.4	15.5	79.0	9.8	5.7	2.1	21.2	30.7	19.0	5.9	LS	83.6	16.4	5.10
M050350604	22-25	C2	2.3	4.8	92.9	3.0	1.8	0.7	17.7	39.5	25.3	9.7	cos	95.1	4.9	19.35
M050350605	25-30	2Ab	9.2	22.9	67.9	15.3	7.6	4.4	38.4	18.4	5.6	1.1	FSL	74.8	25.2	2.97
M050350606	30-39	2Cb1	2.2	2.5	95.4	1.2	1.2	0.5	18.1	33.6	27.3	15.8	cos	97.4	2.6	38.16
M050350607	39-43	2Cb2	3.5	6.9	89.6	4.4	2.4	1.6	45.3	36.8	5.8	0.1	S	92.8	7.2	12.99
M050350608	43-52	3Ab	10.5	24.6	64.9	15.4	9.2	5.1	39.4	16.4	3.3	0.8	FSL	72.5	27.5	2.64
M050350609	52-60	3Bwb	19.0	35.7	45.2	20.8	15.0	10.8	26.1	4.6	2.7	1.1	L	55.9	44.1	1.27

Missala		NH₄O	Ac Extr	Bases		Anid			CEC			Base	Sat	0.00	pН		
Missouri Soil Characterization Laboratory	Ca	Mg	Na	К	Sum Bases	Acid- ity	Extr Al	Sum Cats	NH₄OA C	Bases +Al	Al Sat	Sum	NH₄ OAc	Org C	CaCl ₂	H₂O	CEC-7/CLAY Ratio
Sample #					meq	per 100g	3					Per	cent		.UTIVI		
M050350601	7.2	2.5	N/A	0.1	9.9	3.5	N/A	13.3	11.8	N/A	N/A	74	84	1.4	6.4	6.8	0.76
M050350602	5.3	1.7	N/A	0.1	7.1	3.7	N/A	10.8	9.1	N/A	N/A	66	78	0.8	6.0	6.5	0.65
M050350603	2.8	0.8	N/A	0.1	3.7	1.7	N/A	5.4	4.1	N/A	N/A	68	89	0.4	5.8	6.5	0.76
M050350604	1.3	0.4	N/A	N/A	1.7	1.0	N/A	2.7	2.0	N/A	N/A	63	88	0.1	5.6	6.3	0.87
M050350605	4.0	1.2	N/A	0.1	5.4	2.6	N/A	8.0	6.4	N/A	N/A	67	84	0.6	5.7	6.3	0.70
M050350606	1.0	0.4	N/A	N/A	1.5	0.9	N/A	2.4	1.9	N/A	N/A	61	78	0.1	5.7	6.3	0.86
M050350607	2.0	0.4	N/A	N/A	2.5	1.6	N/A	4.1	3.0	N/A	N/A	61	84	0.2	5.6	6.4	0.86
M050350608	4.7	1.2	N/A	0.1	6.0	3.1	N/A	9.1	7.4	N/A	N/A	66	82	0.5	5.7	6.4	0.70
M050350609	7.0	2.5	N/A	0.1	9.5	4.6	N/A	14.1	12.1	N/A	N/A	67	79	0.7	5.7	6.3	0.64

Field Stop #2: Oak Ridge Conservation Area

Oak Ridge Conservation Area Soil Map









Oak Ridge Conservation Area, consisting of 243 acres, was purchased in December of 1981 by Missouri Department of Conservation. The purpose of the area is to manage and conserve bottomland ecosystems and opportunities that are compatible with the resource.

History and Physical Features:

Of the 243 acres that make up Oak Ridge, a little more than 210 acres are Bottomland Flat Woods. The forest topography is generally flat with the difference between the highest and lowest elevation being approximately 15 feet. The lower elevations are seasonally flooded during the fall through early spring. Tree species for the area include post oak, willow oak, pin oak, overcup oak, mixed hickories, bald cypress, sweetgum and various elms.

Prior to MDC ownership the forest has a history of being high graded, burned, and grazed. The drainage system that has been established across SE Missouri has also played a large factor in what we see today. Since we have purchased the area just less than 40 acres of agriculture fields have been planted into seedling, there have been two timber harvests effecting approximately 90 acres and 60 acres have been designated as old growth.

Currently:	
Woody species by canopy lev	vel:
Stand basel area:	
Trees per acre:	
Site index:	Currently the data for this is outdated
Stocking percent:	I will have current info shortly.
Stand management history:	

Soil Pit #1 - Soils

Speaker: Dan Childress -- Soil Scientist - USDA-Natural Resources Conservation Service

Natric horizons with high levels of exchangeable sodium occur on stream terraces in the Western Lowlands (Bonn Soil). Discuss mapping, identification, and use of new technology--EM-38 meter--for investigations of these soils. On a nearby, lower terrace level, the Forestdale soil has an argillic horizon.

Notes:

Forestry Management Implications

Speaker: Ross Glenn – Forester – Missouri Department of Conservation

Notes:



Stand 5: 20 Acres

- Species by Canopy Level:
 - o Overstory: Post Oak, Willow Oak
 - o Understory: Willow Oak, Hickory, Elm, Black Cherry
- Stand Basal Area: 88
- Trees / Acre: 103
- Site Index Measured: 65
- Stocking: 71%
- Stand History: Prior to MDC ownership the forest has had a history of being high graded, burned, and grazed. Since MDC ownership in 1995 this stand was cut in summer 1999, TSI over most of the stand in Nov. 2004.

Site ID: Name this	s Site Here		Lab ID: MCL MO	503506								
Special Project:	Forest Soils 2006	Soil Pits										
Description Date	: 11/8/2005		Print Date: 8/8/2	006								
Describers Name	e(s): Dennis Meine	ert, Keith Knelle, Mi	chael Wyatt									
Site Notes:			Pedon Notes: En	iter Notes About the Soil Profile Here								
Sampled Name: VOSD	WIDEMAN - <u>View</u>	Correlated Name	:	Certification: Level 2								
Taxonomic Class	sification: Coarse	-loamy, siliceous, s	uperactive, nonac	id, mesic Mollic Udifluvents								
Pedon Type: map	o unit inclusion	Pedon Purpose: scription	full pedon de-	Taxon Kind: Series								
SSURGO MU: 26 1 TO 4 PERCENT		IE SANDY LOAM,	General Soil MU Relfe Association	: MO133 - Poynor-Rueter-Alred-								
MLRA: <u>N116A</u> - C	Dzark Highland		CRA: N116A.7 -	Current River Hills								
County/SSA: MC	035 - CARTER, MO	, USA	7.5' Quad: 36090	O-H8 - Big Spring, Missouri								
Lat/Long: 36° 58'	0" N, 90° 58' 0" W	I	UTM: 679,882 E,	4,093,248N NAD83 , Zone 15								
Legal: 1,828 ft Ea	st and 3,211 ft So	uth from the North	West corner of S3	2, T27N, R1E of the 5th Principle								
US Phys Div: Inte	erior Highlands	US Phys Prov: O	zark Plateau	US Phys Sec: Springfield-Salem plateaus								
MO Eco Sec: OZ lands	- Ozark High-	MO Eco Subsec: River Hills	OZ9 - Current	MO LTA: OZ9e - Current River Oak Forest Breaks								
Landscape: river	valley		Landform: flood plain									
Geo Comp: Flat			Profile Pos: N/A									
Elevation: 447 ft	Aspect: 90°	Slope: 1%	Shape: up/down:	Linear - across: Linear								
Flooding: occasion	onal; brief		Ponding: none									
Drainage: Somewhat ex- cessively drained	Runoff: Negligible	Perm: Moderat ely rapid	Ksat:	Erosion: None - deposition - Gully erosion								
ern red oak (Quercus	jetative Species: rubra) , <u>CEOC</u> - hackb	QUMA2- bur oak (Que) , POPUL- cottonwo	LATA- sycamore (Platanus) , QURU- north- ood (Populus) , <u>JUGLA</u> - walnut (Juglans) ,								
Parent Materials:	Slightly weathere	d, sandy and grave	lly, Holocene Stag	ge alluvium from mixed materials								
Bedrock: N/A												
Geologic Format	ion: Cenozoic Era	ı, Quaternary Syste	m, Holocene Stag	e								
Particle Size Control Section: 10-40" (25-102cm); 6% Clay												
Diagnostic Horizons and Restrictions: Ochric epipedon: 0 to 16 inches (0-41 cm) Lithologic discontinuity: 30 to 43 inches (76-109 cm) Lithologic discontinuity: 43 to 60 inches (109-152 cm) Cambic horizon: 52 to 60 inches (132-152 cm)												

Observation Method: Small Pit

- **A1** --- 0 to 8 inches (0-20 cm); grayish brown (10YR 5/2, dry), and very dark grayish brown (10YR 3/2, moist) silt loam; moderate fine and medium subangular blocky structure; friable; many very fine roots throughout, many fine roots throughout, common medium roots throughout, and common coarse roots throughout; many fine interstitial moderate continuity pores; clear smooth boundary.
- **A2** --- 8 to 16 inches (20-41 cm); 70% very dark grayish brown (10YR 3/2, moist), and 30% brown (10YR 4/3, moist) loam; weak medium and coarse subangular blocky structure; friable; common very fine roots throughout, common fine roots throughout, few medium roots throughout, and few coarse roots throughout; many very fine tubular moderate continuity, many fine tubular moderate continuity, few medium tubular moderate continuity, few coarse tubular moderate continuity pores; clear wavy boundary.
- **C1** --- 16 to 22 inches (41-56 cm); dark brown (10YR 3/3, moist) gravelly loamy sand; weak fine subangular blocky structure; very friable; few fine roots throughout; many fine interstitial moderate continuity, few medium interstitial moderate continuity, few coarse interstitial moderate continuity pores; 25% rounded weakly cemented gravel sized chert fragments; clear wavy boundary.
- **C2** --- 22 to 25 inches (56-64 cm); 50% yellowish brown (10YR 5/4, moist), and 50% brown (10YR 5/3, moist) very gravelly coarse sand; single grain structure; loose; few fine roots throughout, and few medium roots throughout; many fine interstitial moderate continuity pores; 45% rounded weakly cemented gravel sized chert fragments; clear irregular boundary.
- **2ABb** --- 25 to 30 inches (64-76 cm); dark brown (10YR 3/3, moist) gravelly fine sandy loam; weak medium subangular blocky structure; friable; few fine roots throughout; many fine interstitial moderate continuity, many medium interstitial moderate continuity, few coarse tubular moderate continuity pores; 20% subangular weakly cemented gravel sized chert fragments; abrupt wavy boundary.
- **2Cb1** --- 30 to 39 inches (76-99 cm); yellowish brown (10YR 5/4, moist) very gravelly sand; single grain structure; loose; few fine roots throughout; many fine interstitial moderate continuity pores; 55% rounded weakly cemented gravel sized chert fragments; gradual wavy boundary.
- **2Cb2** --- 39 to 43 inches (99-109 cm); 60% brown (10YR 4/3, moist), and 40% yellowish brown (10YR 5/4, moist) stratified fine sandy loam; massive structure; very friable; few fine roots throughout; many fine interstitial moderate continuity pores; common pale brown (10YR 6/3, moist) distinct sand coats on all faces of peds; 10% rounded weakly cemented gravel sized chert fragments; Note(s): thin stratifications; clear smooth boundary.
- **3ABb** --- 43 to 52 inches (109-132 cm); 70% dark brown (10YR 3/3, moist), and 30% very dark grayish brown (10YR 3/2, moist) fine sandy loam; weak fine and medium subangular blocky structure; firm; few fine roots throughout; many fine interstitial moderate continuity, few medium tubular moderate continuity pores; 10% subangular weakly cemented gravel sized chert fragments; clear smooth boundary.
- **3Btb** --- 52 to 60 inches (132-152 cm); very dark grayish brown (10YR 3/2, moist) loam; weak fine and medium subangular blocky structure; friable; few fine roots throughout; many fine interstitial moderate continuity, many medium interstitial moderate continuity, many fine tubular moderate continuity, many medium tubular moderate continuity, few coarse tubular moderate continuity pores; few very dark gray (10YR 3/1, moist) faint clay films on surfaces along pores; 10% subangular weakly cemented gravel sized chert fragments.

Missouri Soil Characterization Laboratory Data

Partical Size Control Section Calculations:

Control Section: **6 - 26in** (15 - 66cm) CEC-7:Clay: **0.54**

Clay: **24%**Sand (total): **18%**Sand (> 0.1mm): **16%**Silt (< 0.1mm): **59%**

PSC Family:

Horizon within

Horizon partially within PSC Sec-

tion

Missalm		HORIZON		TOTAL SILT SAND										SAND	SILT	SAND/SILT
Missauri Soil Characterization Laboratory	naracienzanoi		CLAY <002	SILT .002- .05	SAND .05-2	FINE .002- .02	COARSE .0205	VF .05- .10	F .1025	M .255	C .5-1	VC 1-2	CLASS	(Clay- free)	(Clay- free)	(Clay-free)
Sample #						PERC	ENT of Les	s Than 2	2mm]			
M050350901	0-2	A1	8.8	67.3	23.9	44.1	23.2	2.8	10.3	6.8	2.9	1.1	SIL	26.2	73.8	0.36
M050350902	2-6	Е	9.2	65.4	25.4	43.2	22.2	2.6	10.4	7.0	3.3	2.0	SIL	28.0	72.0	0.39
M050350903	6-12	Bt1	18.6	62.8	18.6	42.8	20.0	1.7	7.9	5.7	2.3	1.0	SIL	22.9	77.1	0.30
M050350904	12-19	Bt2	26.5	57.6	15.9	39.9	17.7	1.4	6.9	4.9	2.0	0.6	SIL	21.6	78.4	0.28
M050350905	19-26	Bt3	26.7	54.2	19.2	36.5	17.7	1.3	8.1	5.9	2.3	1.6	SIL	26.2	73.8	0.35
M050350906	26-37	2Btx1	16.7	56.0	27.3	35.4	20.5	2.2	11.7	8.1	3.5	2.0	SIL	32.8	67.2	0.49
M050350907	37-44	2Btx2	18.9	53.1	28.0	31.9	21.3	2.0	11.9	7.2	3.1	3.8	SIL	34.5	65.5	0.53
M050350908	44-54	3Bt1	40.6	37.1	22.3	18.5	18.7	2.2	9.7	5.8	2.5	2.2	С	37.5	62.5	0.60
M050350909	54-70	3Bt2	42.3	37.0	20.8	24.8	12.2	1.6	8.7	5.4	2.3	2.7	С	36.0	64.0	0.56

Missouri		NH₄O	Ac Extr	Bases		ا د د د	Factor		CEC			Base	Sat	0	рН		
Soil Characterization Laboratory	Ca	Mg	Na	К	Sum Bases	Acid- ity	Extr Al	Sum Cats	NH₄OA c	Bases +Al	Al Sat	Sum	NH₄ OAc	Org C	CaCl ₂	H₂O	CEC-7/CLAY
Sample #		meq per 100g Percent												.01M	п₂О	rans	
M050350901	3.9	1.2	N/A	0.4	5.5	13.9	0.8	19.4	17.6	6.3	12.0	28	31	4.2	4.7	5.3	2.00
M050350902	0.7	0.4	N/A	0.2	1.4	9.0	2.3	10.3	8.2	3.6	63.0	13	17	1.3	4.2	4.9	0.89
M050350903	0.2	0.4	N/A	0.2	0.9	10.0	5.4	10.9	10.5	6.3	86.0	8	8	0.5	4.0	4.7	0.56
M050350904	0.7	1.2	N/A	0.3	2.2	13.5	8.2	15.7	13.9	10.4	79.0	14	16	0.5	4.0	4.7	0.52
M050350905	0.5	2.0	N/A	0.3	2.8	14.4	9.4	17.2	14.1	12.3	77.0	16	20	0.4	3.9	4.6	0.53
M050350906	0.3	1.2	0.1	0.1	1.7	9.5	6.5	11.2	10.1	8.1	80.0	15	16	0.1	3.8	4.7	0.60
M050350907	0.2	1.2	0.2	0.1	1.7	9.2	5.4	11.0	9.7	7.2	76.0	16	18	0.1	3.8	4.8	0.51
M050350908	0.2	3.2	0.6	0.1	4.1	14.4	9.0	18.5	17.7	13.1	69.0	22	23	0.1	3.7	4.7	0.44
M050350909	0.5	4.5	1.1	0.1	6.1	13.1	7.5	19.2	18.1	13.6	55.0	32	34	0.1	3.7	4.5	0.43

Soil Pit #2 - Soils

Speaker: Rod Taylor -- Soil Scientist – USDA-Natural Resources Conservation Service

Crowley Soil Pit

- Fine textured poorly drained soil with vertic soil properties.
- PH ranges from extremely acid to slightly alkaline.
- Increase in Na in lower horizons.
- High aluminum saturation in Eg horizon
- Episaturation vs. endosaturation and slow permeability

Notes:

Soil Pit #2 - Forestry Management Implications

Speaker: Mike P. Anderson – Forester – Missouri Department of Conservation

Notes:



Stand 6: 18 Acres

Species by Canopy Level:

o Overstory: Willow Oak, Sweet Gum, Pin Oak

Midstory: Elm, Hickory, MapleUnderstory: Elm, Maple, Hickory

Stand Basal Area: 126Trees / Acre: 260

• Site Index - Measured: 74

• Stocking: 113%

• Stand History: Prior to MDC ownership the forest has had a history of being high graded, burned and grazed. There are remnant fence pieces throughout the stand.

Site ID: Name thi	s Site Here		Lab ID: MCL M0520704									
Special Project:	Forest Soils 2006	Soil Pits										
Description Date	: 11/21/2005		Print Date: 8/8/2	2006								
Describers Name	e(s): Rod Taylor, I	Leon Thompson, B	rian Kirn, Michael	Wyatt								
Site Notes: Multi- but is not in the vege	flora rose was observ tation listing.	ved at this location	Pedon Notes: Er	nter Notes About the Soil Profile Here								
Sampled Name:	AMAGON - <u>View</u>	Correlated Name	:	Certification: Level 2								
Taxonomic Clas	sification: Fine, s	mectitic, thermic C	Chromic Vertic Epiaqualfs									
Pedon Type: ma	p unit inclusion	Pedon Purpose: scription	e: full pedon de- Taxon Kind: Series									
SSURGO MU: 55 FLOODED	- AMAGON SILT	LOAM, RARELY	General Soil MU Amagon Associa	J: MO047 - Calhoun-Crowley- tion								
MLRA: <u>0131A</u> - S	Southern Mississip	opi Valley Allu-	CRA: O131A.3 -	Black and White River Alluvium								
County/SSA: MC	0 <mark>207</mark> - STODDARD,	MO, USA	7.5' Quad: 36090	0-G1 - Dudley, Missouri								
Lat/Long: 36° 47	' 0" N, 90° 6' 0" W		UTM: 758,042 E	, 4,075,402N NAD83 , Zone 15								
Legal: 2,356 ft Ea	ast and 416 ft Sou	th from the North V	Vest corner of S29	9, T25N, R9E of the 5th Principle								
US Phys Div: Atl	antic Lowland	US Phys Prov: C	oastal Plain	US Phys Sec: Mississippi alluvial valley								
MO Eco Sec: MB	- Mississippi	MO Eco Subsec:	MB1 - White &	MO LTA: MB1c - Otter Slough Silty								
Landscape: river	valley		Landform: terrace									
Geo Comp: Flat			Profile Pos: N/A									
Elevation: 324 ft	Aspect: 0°	Slope: 1%	Shape: up/down	: Linear - across: Linear								
Flooding: rare; b	rief	•	Ponding: rare; b	rief								
Drainage: Poorly drained	Runoff: High	Perm: Very slow	Ksat:	Erosion: None - deposition - Gully erosion								
	getative Species:	QUNI- water oak (Qu		S- elm (Ulmus) , QUST- post oak (Quercus on radicans) , THUJA- red cedar (Thuja)								
Parent Materials	: Slightly weather	ed, clayey, Lower V	Visconsinan Stage	e alluvium from mixed materials								
Bedrock: N/A												
Geologic Format	tion: Cenozoic Era	a, Quaternary Syst	em, Pleistocene S	Series, Lower Wisconsinan Stage								
Particle Size Cor	ntrol Section: 18-	38" (46-97cm); 53°	% Clay									
Diagnostic Horizons and Restrictions: Redox concentrations: 0 to 85 inches (0-216 cm) Ochric epipedon: 0 to 18 inches (0-46 cm) Reduced matrix: 18 to 85 inches (46-216 cm) Argillic horizon: 18 to 85 inches (46-216 cm) Slickensides: 39 to 58 inches (99-147 cm)												

Observation method: Push Tube

A --- 0 to 6 inches (0-15 cm); , Variegated dark gray (10YR 4/1, moist) silty clay; moderate fine subangular blocky structure; firm; common medium roots throughout, many fine roots throughout, and many very fine roots throughout; many fine tubular moderate continuity pores; few dark reddish brown (5YR 3/2, moist) fine distinct weakly cemented irregular masses of iron-manganese accumulation on faces of peds with diffuse boundaries, few dark brown (7.5YR 3/4, moist) fine faint weakly cemented irregular masses of iron-manganese accumulation on faces of peds with diffuse boundaries; abrupt smooth boundary.

Eg --- 6 to 18 inches (15-46 cm); 70% light gray (10YR 7/2, moist), and 30% dark gray (10YR 4/1, moist) silty clay loam; moderate fine subangular blocky structure; firm; common fine roots throughout, common medium roots throughout, and common coarse roots throughout; many fine tubular moderate continuity pores; few strong brown (7.5YR 5/8, moist) fine distinct weakly cemented irregular masses of oxidized iron (fe+3) accumulation on faces of peds with diffuse boundaries, few strong brown (7.5YR 4/6, moist) fine distinct weakly cemented irregular masses of oxidized iron (fe+3) accumulation on faces of peds with diffuse boundaries; clear smooth boundary.

Btg1 --- 18 to 27 inches (46-69 cm); dark gray (2.5Y 4/1, moist) silty clay; strong fine subangular blocky structure; very firm; few fine roots throughout, and few medium roots throughout; common very fine tubular moderate continuity, common fine tubular moderate continuity pores; few dark gray (10YR 4/1, moist) distinct clay films on all faces of peds; few dark yellowish brown (10YR 4/6, moist) fine prominent weakly cemented irregular masses of oxidized iron (fe+3) accumulation on faces of peds with diffuse boundaries; gradual smooth boundary.

Btg2 --- 27 to 39 inches (69-99 cm); dark gray (2.5Y 4/1, moist) silty clay; moderate fine subangular blocky structure; very firm; few fine roots throughout, and few medium roots throughout; few very fine tubular moderate continuity, few fine tubular moderate continuity pores; common dark gray (2.5Y 4/1, moist) distinct clay films on all faces of peds; few dark yellowish brown (10YR 4/6, moist) fine prominent weakly cemented irregular masses of oxidized iron (fe+3) accumulation on faces of peds with diffuse boundaries; gradual smooth boundary.

Btssg --- 39 to 58 inches (99-147 cm); dark gray (2.5Y 4/1, moist) silty clay; moderate fine subangular blocky structure; very firm; few fine roots throughout; few very fine tubular moderate continuity pores; few grayish brown (2.5Y 5/2, moist) distinct slickensides, few dark gray (2.5Y 4/1, moist) faint clay films on all faces of peds; gradual smooth boundary.

Btg3 --- 58 to 75 inches (147-190 cm); gray (2.5Y 5/1, moist) silty clay; moderate medium subangular blocky structure; very firm; few fine roots throughout; few very fine tubular moderate continuity pores; few very dark gray (2.5Y 3/1, moist) distinct clay films on all faces of peds; few black (10YR 2/1, moist) fine prominent weakly cemented irregular masses of manganese accumulation on faces of peds with diffuse boundaries; gradual smooth boundary.

2Btkg --- 75 to 85 inches (190-216 cm); gray (2.5Y 5/1, moist) silty clay; moderate medium subangular blocky structure; very firm; few very fine tubular moderate continuity pores; few dark gray (2.5Y 4/1, moist) distinct clay films on all faces of peds; few black (10YR 2/1, moist) fine prominent weakly cemented irregular iron-manganese nodules on faces of peds with diffuse boundaries; few very pale brown (10YR 8/1, moist) medium prominent extremely weakly cemented irregular masses of carbonate on faces of peds with diffuse boundaries.

Missouri Soil Characterization Laboratory Data

Partical Size Control Section Calculations:

Control Section: **18 - 38in** (46 - 97cm)

CEC-7:Clay: **0.61** Clay: **53%** Sand (total): 1% Sand (> 0.1mm): **1%** Silt (< 0.1mm): 46%

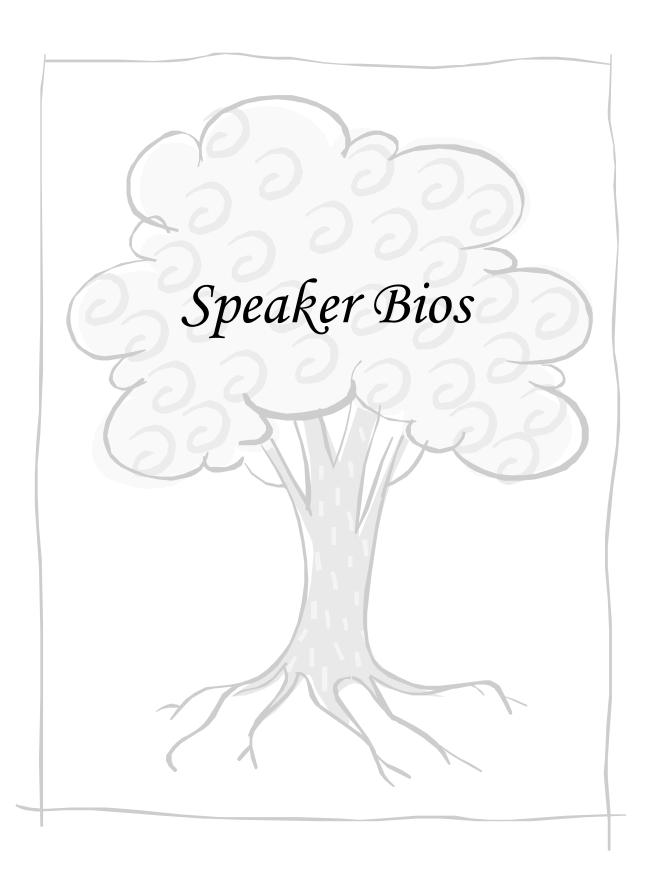
PSC Family:

Horizon within PSC Section Horizon partially within PSC Sec-

tion

Missouri	DEPTH (in)	HORIZON		TOTAL			SILT		5	SAND			TEXT CLASS	SAND (Clay-	SILT (Clay-	SAND/SILT (Clay-free)
Missouri Soil Characterization aboratory Sample #	()		CLAY <002	SILT .002- .05	SAND .05-2	FINE .002- .02	COARSE .0205	VF .05- .10	F .10- .25	M .25- .5	C .5-1	VC 1-2		free)	free)	(cizy iiee)
					PE	RCENT	of Less Thar									
M052070401	0-6	А	42.2	53.4	4.4	40.0	13.5	1.2	1.3	0.6	8.0	0.5	SIC	7.6	92.4	0.08
M052070402	6-18	Eg	35.0	62.6	2.4	44.2	18.4	0.9	0.7	0.3	0.2	0.2	SICL	3.7	96.3	0.04
M052070403	18-27	Btg1	49.7	48.9	1.4	33.1	15.8	0.7	0.4	0.1	0.1	0.1	SIC	2.8	97.2	0.03
M052070404	27-39	Btg2	55.9	42.9	1.2	30.1	12.8	0.5	0.3	0.1	0.1	0.3	SIC	2.7	97.3	0.03
M052070405	39-58	Btg3	56.5	42.2	1.3	29.1	13.1	0.5	0.4	0.2	0.1	0.0	SIC	3.0	97.0	0.03
M052070406	58-75	Btg4	51.2	47.4	1.4	32.2	15.1	0.4	0.5	0.2	0.2	0.2	SIC	2.9	97.1	0.03
M052070407	75-85	Btg5	47.0	49.0	4.0	33.6	15.4	1.1	1.0	0.5	0.9	0.5	SIC	7.5	92.5	0.08

Missouri	NH₄OAc Extr Bases					Acid-		CEC				Base Sat		Ora	pН		
Soil Characterization	Ca	Mg	Na	К	Sum Bases	ity	Extr Al	Sum Cats	NH₄OA C	Bases +Al	Al Sat	Sum	NH₄ OAc	Org C	CaCl₂ .01M	H₂O	CEC-7/CLAY Ratio
Sample #	meq per 100g											Percent					
M052070401	7.4	5.7	0.2	0.7	14.0	19.9	2.9	33.9	31.1	16.9	17.0	41	45	4.8	4.3	4.9	0.74
M052070402	3.5	3.3	0.3	0.2	7.2	14.8	7.8	22.1	20.3	15.0	52.0	33	36	0.9	3.9	4.6	0.58
M052070403	7.2	6.2	0.8	0.3	14.5	17.6	8.4	32.1	31.3	22.9	37.0	45	46	0.6	3.8	4.2	0.63
M052070404	8.7	9.2	1.6	0.4	19.9	16.6	6.9	36.5	33.6	26.7	26.0	54	59	0.4	3.9	4.2	0.60
M052070405	12.9	14.4	2.5	0.3	30.0	9.7	0.5	39.7	37.1	30.5	2.0	76	81	0.3	5.0	5.1	0.66
M052070406	15.4	16.9	2.5	0.3	35.1	4.0	0.0	39.1	37.9	35.1	0.0	90	93	0.2	7.1	7.3	0.74
M052070407	25.6	18.0	2.3	0.2	46.1	2.7	0.0	N/A	37.1	N/A	N/A	N/A	100	0.2	7.6	7.8	0.79





Aide, Michael

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Education: Mississippi State University (Ph.D., Soil Chemistry Major, Chemistry, Minor; M.S., Soils)

University of Wisconsin-Madison (B.S. Soils)

University of Wisconsin-Platteville (B.S. Chemistry and Matematics)

Professional Experience:

Professor of Physics and Engineering-Physices Interim Chairperson, Department of Agriculture

Research Interests

<u>Soil</u>: Research interests center on the chemical behavior of transition metals in soil, especially metal-oxide adsorption mechanisms. A second area of interest involves clay mineralogy and soil formation (genesis). Both areas require continuing interest in analytical instrumentation, especially NMR, HPLC, FT-IR, XRD, SEM, MS-ICP, INAA, and EXAFS.

Allen, Lisa G.

Contact Info:

Education: University of Missouri-Columbia (M.S. Urban & Community Forestry; B.S. Forest Management)

Professional Experience:

Worked for MDC since 1984 in many roles:

Assistant Resource Forester, Southeast Missouri

Resource Forester, Columbia, Missouri

Supervisor of Urban & Community Forestry Program Forest Management Chief, Southern & Eastern Missouri

Administrator of Private Land Services Division

State Forester

Personal:

Married; three children Resides in Jefferson City

Anderson, Mike P.

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College: University of Missouri, Forest Resource Management, 1975

Professional Experience:

Forester, Missouri Department of Conservation, Perryville Forestry Office

Management Forester, Kerr McGee

Procurement Forester, Westvaco Corporation Various positions, MDC Forestry Division



Breen, Tim

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Ozark National Scenic Riverways

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Education: Georgia Southern University (M.S. Biology)

St. Louis University (B.S. Biology)

Professional Experience:

Terrestrial Ecologist, Ozark National Scenic Riverways (1 year)

Regional Non-game Biologist, Florida Fish & Wildlife Conservation Commission (10 years)

Personal:

Married, wife - Samantha: son- Aidan (2 1/2)

Childress, Dan

Contact Info: Dexter MLRA Project Office

18450 Ridgeview Lane, Dexter, MO 63841 573 624-5939 ext. 145

e-mail: dan.childress@mo.usda.gov

Education: Mississippi State University, Mississippi State, MS (B.S. 1972, M.S. 1976

Soil Survey Experience:

29 years – 5 soil surveys in Ozarks of southeastern Missouri, 2 in southeastern Kentucky

Soil Scientist, Supervisor/MLRA Project Leader for the last 11 years

Current Projects/interests:

Revising flooding information on older surveys

Western Lowlands soils – Bosket on dunes and Lafe-Foley on terraces

Personal:

Married, wife - Carol: Daughters - Suzanne (26), and Danielle (20)

Hobbies - Canoeing, hiking, caving

Mapped soils on the highpoint of both Missouri and Kentucky: Taumsauk Mountain at 1,772 feet and Black

Moun tain at 4,145 feet. It's been downhill ever since!

Cook, Mike

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e-mail: mike.cook@mo.usda.gov

Education: Southwest Missouri State University -- Springfield, Missouri (B.S. 1976)

Soil Survey Experience:

29 years Soil Survey

NRCS Soil Scientist/Project Leader/ARSS/Team Leader, Missouri.

Currently supervising the NRCS soil survey maintenance work in 20 counties in Southwest Missouri.

C



Depuy, John

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email: leon.thompson@dnr.mo.gov

Education: Southern Illinois University (M.S. Forest Ecology, B.S. Forest Resource Management)

Certificates: Certified Professional Soil Scien

Certified Professional Forester

Professional Experience:

Soil Conservation Technician - Stephenson Soil & Water Conservation District, IL

Forester – Bureau of Land Management, OR Soil Scientist – Bureau of Land Management, OR Soil Scientist – Mark Twain National Forest

Personal:

Married, wife Roberta; two daughters Ruth Ann (20), Sarah Elizabeth (15)

Glenn, Ross

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Education: Southern Illinois University, Forest Resources Management, 1996

Professional Experience:

Forester, Missouri Department of Conservation, New Madrid Forestry Office

Westvaco Corporation alluvial plantations Land Between the Lakes in west Kentucky

Kentucky Division of Forestry

Harrell, Robert (Bob) A.

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Education: B.S. Forest Management - Southern Illinois University - 1969

M.S. Resource Development – Michigan State University – 1971

Professional Experience:

Employed by United States Forest Service 1971 to present (Mississippi, Virginia, Minnesota, Vermont and Missouri)





Henderson, Dick

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Education: Southwest Missouri State University - Springfield, Missouri (B.S. 1983)

Soil Survey Experience:

- 22 years-6 Soil Surveys
- Department of Natural Resources Soil Scientist, Supervisor

Personal:

- Hobbies- Raising children, farming
- Children, 2 sons Nicholas (19), Jordan (13); daughter Morgan (9)

Hunt Moore, Gretchen

Contact Info:

Education: Texas A&M-Commerce (M.S. 1991 – Earth Science; B.S. 1980 – Geology and Biology)

Professional Experience:

- Sulpetro, LTD, Geologist, Dallas, Texas 1980-1983
- Southern Union Exploration, Geologist, Dallas, Texas 1983-1985
- Wessely Energy, Seismic Assistant, Dallas, Texas 1985-1987
- USDA Forest Service, Geologist, Ouachita NF R8, 1991-1999
- USDA Forest Service, Minerals and Geology Program Mgr, Kisatchie NF & NF's of Mississippi, R8, 1999-2003
- USDA Forest Service, Minerals and Geology Program Mgr. Mark Twain & Shawnee NF, R9 2003-present

Other Professional experience:

Adjunct Instructor

Earth Science, Ouachita Tech, Malvern, AR 1994-1999 Physical Geology, Henderson State College, Arkadelphia, AR 1996-1999 Earth Science & Geology, Northwestern University, Natchitoches, LA 2000-

2002

Kabrick, John

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Professional Experience:

- Currently Research Forester for the USDA Forest Service
- Formerly employed by the Missouri Department of Conservation



Knoernschild, Timothy

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Education: University of Missouri, Columbia

Soil Survey:

- 22 months SWCD soil scientist
- 17 years MoDNR soil scientist
- Soil Surveys: Pettis County, Morgan County, Miller County and others as detailed

Other Projects:

- Piezometer study for saturation in oxyaquic classification
- On-site reports for intensive land use

Personal:

- Married: three sons also married
- Farmer
- Private consulting business
- Hobbies centering on outdoor activities

Meinert, Dennis

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Education: Southwest Missouri State University -- Springfield, Missouri (B.S. 1979)

Soil Survey Experience:

- 27 years 4 soil surveys
- Department of Natural Resources Soil Scientist, Supervisor.

Detailed Mapping Projects:

- Missouri Forest Ecosystem Project
- National Park Service project, Confluence, Morris and Cuivre River State Parks
- Multiple research projects throughout the state of Missouri.

Personal:

- Married, wife Judy: sons James (22), John, (19), Joseph, (13); Daughters Rianna (25), and Theresa (16)
- Hobbies Rabbit hunting.
- Consulting I have a successful soil consulting business now in its 10th year.

Moore, Dave

Contact Info:



Nelson, Paul

Contact Info



Education: Southern Illinois University (M.S. Botany)
Southwest Missouri State University (B.S. Wildlife Management)

Professional Experience:

- Ecology and Land Management Planner, Mark Twain National Forest in Rolla (helped integrate an ecosystem management framework into the 2005 Forest Plan)
- Served on Missouri's Natural Areas Committee for 27 years (committee is responsible for inventory, designation and management of Missouri's natural areas)
- Completed botanical illustrations for more than 10 botanical guides, including:
 - ♦ Trees of Missouri
 - ♦ Shrubs and Woody Vines of Missouri
 - ♦ Ferns of Arkansas
 - ♦ Several volumes of "The Illustrated Flora of Illinois"
- Recently published a book that characterizes Missouri's terrestrial ecosystems
- Retired from Missouri Department of Natural Resources' state park system after 25 years
- Established a nationally recognized natural resource management program
- Expertise includes:
 - ♦ ecosystem classification,
 - ♦ assessment of ecological health
 - determining desirable forest health conditions
 - determining prescriptions for restoring healthy ecosystems

Personal:

- Spent most his life in Missouri
- Resides in Loose Creek, Missouri
- Married, wife Linda

Nigh, Timothy (Tim) A.

Contact Info: Missouri Department of Conservation

1110 S. College Avenue Columbia, MO 65201 573-882-9909 Ex. 3244

email: Timothy.Nigh@mdc.mo.gov

Education: studied at University of Montana and University of Western Australia University of Missouri, Columbia (B.S. Forestry, B.A. Biology, M.S Forestry Ecology)

Professional Experience:

- Missouri Department of Conservation, 20 years, as Natural History Inventory Biologist, Natural Areas Biologist, Heritage Community Ecologist, Planning Specialist and Resource Scientist
- · Currently involved in development and implementation of Missouri's Comprehensive Wildlife Strategy
- Coordinated the MO Ecological Classification System Project
- Co-Authored the Atlas of Missouri Ecoregions.
- Instructor for an Outward Bound modeled program for juvenile delinquents, 6 years
- Tree planting SE United States
- USFS in Alaska
- Plant ecological research, Austraila

Personal:

- Spend a lot of free time floating and fishing on the Missouri River and in the Ozarks.
- Love working with students, both academic and professional
- Committed to effective, long-term resource conservation initiatives
- Native Missourian



Ponder, Felix Jr.

Contact Info: Lincoln University

208 Foster Hall Jefferson City, MO 65102 e-mail: fponder@fs.fed.us

Education: Southern Illinois University (Ph.D. Botony);

Tuskegee University, AL (M.S. Soil Chemistry); Fort Valley State University, GA (B.S. Agronomy)

Professional Experience:

 37 years with the U.S. Dept. of Agriculture; 30 of 37 as a Research Soil Scientist at the North Central Research Station

Research Interests:

- Long-term site productivity of Central Hardwood Forest soils
- Organic matter decomposition and its interactions with soil inhabitants
- · Belowground competition between roots, other flora, fauna and plant produced chemical inhibitors
- Tree physiology
- Alley cropping
- Root growth and mechanisms that regulate the optimum shoot/root ratio for stems that develop from stump sprout

Preston, John (JP)

Contact Info: Springfield MLRA Project Office

688 South State Highway B, Suite 500

Springfield, Missouri 65689 417-831-5246 ex. 125

e-mail: john.preston@mo.usda.gov

Education: Southwest Missouri State University -- Springfield, Missouri (B.S. 1974)

Soil Survey Experience:

- 30 years 11 soil surveys
- District Soil Scientist, Missouri
- SCS Soil Scientist, Arizona
- NRCS Soil Scientist/Project Leader/Team Leader, Missouri.
- Currently supervising the NRCS soil survey maintenance work in 20 counties in Southeast Missouri.

Mapping Details:

- Helicopter Mountains Mapping Detail, Arizona;
- U.S. Army Proving Ground, Yuma, Arizona;
- Maine Mapping Detail, Ellsworth, Maine;
- Precise Chemical Application Project, Southeast Missouri;
- MoFEP Mapping Detail, Missouri.

Personal:

- Married, wife Pamela: son Tyler (23); daughter Brianne (19).
- Hobbies modified stock car racing (pit crew, not crazy enough to drive the dang thing), deer hunting, cooking



Taylor, Rod

Contact Info: Dexter MLRA Project Office

18450 Ridgeview Lane, Dexter, MO 63841

573 624-5939 ext. 146

e-mail: rod.taylor@mo.usda.gov

Education: Central Missouri State University - Warrensburg, Missouri

Soil Survey Experience:

• 16 years – 5 soil surveys

• MLRA update in Southeast Missouri

Thompson, Leon

Contact Info: Missouri Department of Natural Resources

Southeast Regional Office 2155 N. Westwood Boulevard Poplar Bluff, Missouri 63901

573-840-9439

email: leon.thompson@dnr.mo.gov

Education: Southwest Missouri State University – Springfield, Missouri (B.S. 1987)

Soil Survey Experience:

• 13 years-2 Soil Surveys

Department of Natural Resources Soil Scientist

Personal:

Married, wife- Joyce

• Hobbies- Finding unusual sights in out of the way places.

• Farming-Raising beef cattle and hay.

Tuttle, John G.

Contact Info: Forestry Field Program Supervisor-Forest Products

P.O. Box 180

Jefferson City, MO 65102-0180 573-522-4115 Ex. 3304 email: John.Tuttle@mdc.mo.gov

Education: University of Missouri, Columbia (B.S. Forestry – Cum Laude)

Professional Experience:

- Forest Field Program Supervisor Forest Products, Missouri Department of Conservation (January 2006 present)
- Resource Forester , Missouri Department of Conservation, Carter County, MO (June 1999 January 2006)
- Independent Logger, Shannon County, MO (June 1977 August 1995)